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April 26, 2024

The Mayor and Council
Municipality of North Middlesex
229 Parkhill Main Street
Parkhill, ON
N0M 2K0

Gentlemen and Mesdames:

Re: Lockhart Drain "A" and "D"

In accordance with your instructions, R. Dobbin Engineering has undertaken an examination of the Lockhart Drain in the Municipality of North Middlesex.

Authorization under the Drainage Act

This Engineers Report that has been prepared under Section 78 of the Drainage Act as per a request from an affected Landowner.

Under Section 78 of the Drainage Act, Council may undertake and complete the maintenance or repair of any drainage works constructed under a bylaw passed under this Act or its predecessor. Section 78 is to be used where it is considered expedient to change the course of the drainage works, or to make a new outlet for the whole or any part of the drainage works, or to construct a tile drain under the bed of the whole or any part of the drainage works as ancillary thereto, or to construct, reconstruct or extend embankments, walls, dykes, dams, reservoirs, bridges, pumping stations, or other protective works as ancillary to the drainage works, or to otherwise improve, extend to an outlet or alter the drainage works or to cover the whole or any part of it, or to consolidate two or more drainage works, the Council whose duty it is to maintain and repair the drainage works or any part thereof may, without a petition required under Section 4 but on the report of an Engineer appointed by it, undertake and complete the drainage works as set forth in such report.

Background

The Lockart Drain "A" outlets into a watercourse in Lot 9, Concession 7, WCR. It continues generally easterly and southerly to Lot 5, Concession 6 ECR. The Lockhart

Drain “A” serves as an outlet for branches “B” to “J”, except “I” and with duplicates of “B”, “C”, “D” and “E”.

Under an Engineer’s Report dated November 20th, 1936 the Lockhart Award Drain was constructed from Lot 5, Concession 6 WCR to Lot 2, Concession 7 WCR.

Under an Engineer’s Report dated July 3rd, 1958 the Lockhart Drain “A”, “B”, “C”, “D” and “E” in Lot 5 were constructed.

Under an Engineer’s Report dated February 23rd, 1960 the Lockhart Drain “A” was extended downstream to Lot 8, Concession 7 WCR and Branches “A” to “J” (excluding “I”) were constructed.

Under an Engineer’s Report dated August 29th, 1974 the Lockhart Drain “A” was cleaned, Branch “B” in Lot 5 was enclosed and culverts were replaced.

Under an Engineer’s Report dated July 7th, 1975 existing culverts were repaired with a concrete floor in the E ½ of Lot 9, Concession 7 WCR.

On-Site Meeting

A site meeting was held on December 1, 2022.

The following were present at the meeting:

- Josh Warner (R. Dobbin Engineering)
- Joanne Sadler (Municipality of North Middlesex)
- Art Mollard (Landowner)
- Mary Lou Mollard (Landowner)
- Brad Masschelein (Landowner)
- Ron Masschelein (Landowner)
- Laurie-Ann Masschelein (Landowner)
- Dave Masfrankc (Landowner)
- Jason Masfrankc (Landowner)
- Bill Heaman (Landowner)
- Amanda Kustermans (Landowner)
- Bill Ritchie (Landowner)

The following is a brief summary of the meeting:

- General discussion of the Drainage Act and Landowners rights under the Drainage Act.
- Josh Warner stated that a standard culvert will provide an 8m access width. A standard culvert will be proposed to be assessed with a shared cost between the benefitting property and upstream properties as an outlet assessment. If a Landowner requests a wider access width, the additional cost beyond a standard access will be assessed to the requesting property.
- Original Request is for a new culvert on the property with Roll Number 00-060-079 (Masschelein).
    - Landowner requested a 12m access width.
- Bill Ritchie stated that Branch "D" is undersized and requires replacement.
- The owner of the property with Roll Number 00-040-080 (Bill Heaman) requested that Branch "A" be enclosed through the property. Josh Warner stated that he will consult with the upstream Landowner as well to see if they would like it enclosed. Landowners were made aware that enclosures are not eligible for grant and are largely assessed to the requesting Landowners.
- With the notice, Landowners were given a plan with a preliminary drainage area. It was mentioned that should Landowners have any concerns with the drainage area as presented they should bring it up to the engineer. No Landowners expressed any concerns with the drainage area as presented.
- The culverts on the drain will be investigated and replaced as required. Any culverts not replaced will be specified for future replacement.
- No adverse soil conditions were noted at the site meeting.

Discussion

Following the site meeting, an estimate was prepared to enclose the Lockhart Drain "A" on the properties with Roll Number 00-040-080 and 00-040-035. The Landowners decided not to proceed with the enclosure.

Upon receiving the draft report, the Ausable Bayfield Conservation Authority requested that the culvert on their property be replaced with a low level crossing constructed using hog slats.

Draft Report

A draft report, dated February 14, 2024 was sent to all the affected Landowners and a meeting was held on March 12, 2024 to go over the report and address any questions and concerns related to the draft report. The following were present at the meeting:

- Josh Warner (R. Dobbin Engineering)
- Joanne Sadler (Municipality of North Middlesex)
- Pete Roelands (Landowner)
- Bev Ritchie (Landowner)
- Bill Ritchie (Landowner)
- Art Mollard (Landowner)
- Mary Lou Mollard (Landowner)
- Chris MacGregor (Landowner)
- Connie MacGregor (Landowner)
- Doug Vanderkant (Landowner)
- Michael Whiting (Landowner)
- Jared Tweedle (County of Middlesex)
- Ron Falck (Landowner)
- Amanda Kustermans (Landowner)
- Adrian Kustermans (Landowner)
- Jan Thatcher (Landowner)

The following is a brief summary of the meeting:

- General discussion of the Drainage Act.
- The Landowner of the property with Roll Number 000-040-033 provided a tile map to show that the property had been tiled outside of the watershed. R. Dobbin Engineering was to revise the report to reflect this.
- The Landowner of the property with Roll Number 000-060-078 requested to remove the culvert themselves, rather than have it replaced.
- The Landowner of the property with Roll Number 000-060-080 provided a tile map and stated that they no longer require Branch "D" on their property as it has been privately tiled. R. Dobbin Engineering was to investigate different tile routes on the property.

Discussion

Following the draft report meeting R. Dobbin Engineering investigated multiple tile routes for Branch "D" on the property with Roll Number 000-060-080 and determined that heading northerly at the connection to Branch "F" would be the best solution. This would allow Branch "D" to be abandoned between Branch "F" and "E".

Drain Classification

The Lockhart Drain is currently classified as a class "F" drain. This rating is according to the Department of Fisheries and Oceans (DFO) classification as presented by the Ontario Ministry of Agriculture, Food and Rural Affair's Agricultural Information Atlas.

Class "F" drains are intermittent or ephemeral (dry for more than two consecutive months).

Approvals

The drain will require approval from the Ausable Bayfield Conservation Authority and the Department of Fisheries and Oceans. Construction cannot commence without necessary approvals.

Existing Conditions

Below is a summary of the condition of the existing culverts:

Culvert Number	Location	Existing Culvert Size	Condition	Recommendation
1	Roll Number 00-060-086 (Whiting)	3000mm Wide Opening Concrete Box Culvert with Concrete Spillway in Bottom	Okay	Leave. Develop provisions for future replacement.
2	Roll Number 00-060-084 (Ritchie)	1600mm dia. Boiler Shell and Concrete Pipe	Okay. Pipes and joint are okay. No noticeable settlement from joint.	Leave. Develop provisions for future replacement.
3	Roll Number 00-060-083 (Mollard)	1800mm dia. CSP	Okay. Pipe is in good condition but minimal cover.	Leave. Develop provisions for future replacement.
4	Grand Bend Road	3800x1200mm Wide Opening Concrete Box Culvert	Okay. Footing exposed with some deterioration	Leave. Develop provisions for future replacement.
5	Roll Number 00-060-080 (Kustermans)	1600mm dia. CSP	Okay. Rust below spring line.	Leave. Develop provisions for future replacement.
6	Roll Number 00-060-079 (Masschelein)	1200mm dia. CSP	Poor. Deformed.	Replace

Culvert Number	Location	Existing Culvert Size	Condition	Recommendation
Station 2+605	Roll Number 00-060-079 (Masschelein)	3600mm Wide Opening Concrete Box Culvert	Poor. Large cracks and exposed footing.	Remove. Secondary Access.
Station 3+065	Roll Number 00-060-078 (Ritchie)	2600mm Wide Opening Concrete Box Culvert and 1500mm dia. Concrete Pipe	Poor. Footing undermined and poor joint.	Landowner to Remove and Restore Bank. Not Required.
7	Grieves Road	2300mm Wide Opening Concrete Box Culvert	Rebar exposed and delaminations. Footing undermined	Replace
8	Roll Number 00-040-084 (Roelands)	1200mm dia. CSP	Okay. Rust below spring line.	Leave. Develop provisions for future replacement.
9	Roll Number 00-040-083 (Conservation Authority)	1200mm dia. CSP	Okay. However. beavers have dug under and around culvert. Does not appear used.	Replace with low level Crossing.
10	Roll Number 00-040-082 (Falck)	1200mm dia. CSP	Poor. Rust below spring line and large holes at haunches.	Replace with Shorter access at Request of Landowner
11	Roll Number 00-040-081 (Toonen)	1200mm dia. CSP	Poor. Rust below spring line and large holes at haunches.	Replace
12	West Corner Drive	1500mm dia. CSP	Okay. Large amount of rust but no holes.	Leave. Develop provisions for future replacement.

Design

The agricultural culverts shall be designed to provide outlet for a 1 in 5-year storm event. The municipal road culverts shall be designed to provide outlet for a 1 in 25-year storm event. The county road culverts shall be designed to provide outlet for a 1 in 100-year storm event.

The tile drain shall be designed to accommodate a drainage coefficient of 50mm / 24 hours.

Recommendations

It is therefore recommended that the following work be carried out:

1. The Lockhart Drain "A" shall be improved with the replacement of Culverts No. 6, 7, 9, 10 & 11, removal of the Culvert at Station 2+605 and future specifications for the replacement of the remaining culverts along the length of the drainage works.

2. The specifications, profile and maintenance schedule for the Lockhart Drain "A" shall be updated.

3. The existing Lockhart Drain "D" and Lockhart Drain "H shall be replaced with the proposed Lockhart Drain "D". The existing Lockhart Drain "H" shall be abandoned in its entirety. The existing Lockhart Drain "D" upstream of Branch "E" shall be abandoned. Branch "D" downstream of Branch "E" shall be renamed to Branch "E". A new maintenance schedule shall be developed for the new Branch "E".

Estimate of Cost

It is recommended that the work be carried out in accordance with the accompanying Specification of Work and Profile that forms part of this Report. There has been prepared an Estimate of Cost in the amount of $653,188, including engineering of the report, attending the Meeting to Consider the Report, attending the Court of Revision, and an estimate for tendering, contract administration and inspection. Appearances before appeal bodies have not been included in the cost estimate.

A plan has been prepared showing the location of the work and the approximate drainage area. A profile is included showing the depths and grades of the proposed work.

Assessment

As per Section 21 of the Drainage Act, the Engineer in their Report shall assess for benefit and outlet for each parcel of land and road liable for assessment. Lands, roads, buildings, utilities, or other structures that are increased in value or are more easily maintained as a result of the construction, improvement, maintenance, or repair of a drainage works may be assessed for benefit. (Section 22)

Lands and roads that use a drainage works as an outlet, or for which, when the drainage works is constructed or improved, an improved outlet is provided either directly or

indirectly through the medium of any other drainage works or of a swale, ravine, creek, or watercourse may be assessed for outlet. The assessment for outlet shall be based on the volume and rate of flow of the water artificially caused to flow into the drainage works from the lands and roads liable for such assessments. (Section 23)

The Engineer may assess for special benefit any lands for which special benefits have been provided by the drainage works. (Section 24)

A Schedule of Assessment for the lands and roads affected by the work and therefore liable for the cost thereof will be prepared as per the Drainage Act. Also, assessments may be made against any public utility or road authority, as per Section 26 of the Drainage Act, for any increased cost for the removal or relocation of any of its facilities and plant that may be necessitated by the construction or maintenance of the drainage works.

The cost of any approvals, permits or any extra work, beyond that specified in this Report that is required by any utility, government ministry or organization (federal or provincial), or road authority shall be assessed to that organization requiring the permit, approval, or extra work.

The estimated cost of the drainage works has been assessed in the following manner:

1. As per Section 26 of the Drainage Act, the roads and utilities have been assessed the increased cost of the drainage works caused by the existence of the works of the public utility or road. The road crossings, with the exception of the extra cost to locate and work around utilities, has been assessed with 100% of the estimated cost assessed as a special benefit assessment to the road authority. The utilities have been assessed 100% of the estimated cost to work around that utility and the daylighting costs as a special benefit assessment to that utility.

2. Due to the location of the watermain on the Lockhart Drain “D” at Grieves Road the downstream drain is required to be deepened to avoid any conflict. The increased costs to install a deeper tile has been assessed to the water authority as a special benefit assessment as per Section 26 of the Drainage Act.

3. The replacement of the access culverts has been assessed based on the culvert length required to provide an 8m top width (standard culvert). This standard culvert has been assessed with 50% of the cost applied as benefit assessment to property and the remainder of the cost assessed as an outlet assessment on upstream lands and roads based on equivalent hectares. The additional cost to provide a wider access has been assessed to the requesting property as a benefit assessment.

4. The cost of removing the culvert at Station 2+605 has been assessed to the property as a special benefit assessment as it is a secondary access and is not eligible for grant.

5. The engineering for the access culverts not being replaced has been assessed with 50% of the cost applied as a benefit assessment to the property and the remainder of the cost assessed as an outlet assessment to upstream lands and roads based on equivalent hectares.

6. The maintenance schedule update for the Lockhart Drain "A" has been updated with 50% assessed as a benefit assessment and the remainder assessed as an outlet assessment to the upstream lands and roads based on equivalent hectares.

7. The additional cost to provide a drainage coefficient above the 38mm/24hrs has been assessed to the benefitting properties as a special benefit assessment. This cost will not be eligible for grant.

8. The remaining cost of the drainage works has generally been assessed with 50% of the cost applied as a benefit assessment and the remainder applied as outlet assessment to the upstream lands and roads based on equivalent hectares.

All final costs included in the cost estimate of this report, except as identified above, shall be pro-rated based on the Composite Schedule of Assessment. Any additional costs shall be assessed in a manner as determined by the Engineer in accordance with the Drainage Act.

Allowances

Under Section 29 of the Drainage Act, the Engineer in his report shall estimate and allow in money to the Owner of any land that it is necessary to use for the construction or improvement of a drainage works or for the disposal of material removed from drainage works. This shall be considered an allowance for right-of-way.

Under Section 30 of the Drainage Act, the Engineer shall determine the amount to be paid to persons entitled thereto for damage, if any, to ornamental trees, lawns, fences, land and crops occasioned by the disposal of material removed from a drainage works. This shall be considered an allowance for damages.

Allowances have been made, where appropriate, as per Section 29 of the Drainage Act for right-of-way and as per Section 30 of the Drainage Act for damages to lands and crops. Allowances for right of way are based on a land value of $50,000.00 per hectare

($12,140.00 per acre). Allowances for crop loss are based on $2,000.00 per hectare for the first year and $1,000.00 for the second year ($3,000.00 per hectare total).

Access and Working Area

Lockhart Drain "A"

Construction:

Access to the work site for the proposed work on the Lockhart Drain "A" shall be from West Corner Drive and within the property the improvements are located, except for the replacement of the culvert on the property with Roll Number 00-040-083. For this access culvert, access shall be gained from the property with the Roll Number 000-040-084, along the existing access and along the length of the drainage works. All access shall be restricted to a width of 6 metres and shall generally be along fence lines, and existing access laneways.

The working area for the construction at each culvert and for any channel improvements shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert or improvements.

Maintenance:

Access for culvert maintenance and channel repair on a single property shall be from the properties in which the culvert or channel is being repaired or maintained. If maintenance is being done on multiple properties access shall be gained from the nearest roadway and shall be along the length of the drainage works. The working area at each culvert shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert. The working area for channel maintenance shall be restricted to a width of 10m from the side the excavation is taking place. The channel shall generally be excavated from the south side of the channel unless otherwise determined by the Drainage Superintendent. If, at the discretion of the Drainage Superintendent, there is erosion on the channel opposite the working area access may be gained along the channel and nearest culvert to maintain the bank.

The working area for future maintenance at each culvert shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert.

Lockhart Drain "D"

Access to the work site for construction and future maintenance shall be from West Corner Drive and Grieves Road and along the length of the drainage works. Access shall generally be restricted to a width of 6 metres and shall be along existing access laneways.

The working area for the construction and future maintenance of the proposed tile drain shall be restricted to a width of 20m along the length of the drainage works normally centred on the proposed tile drain.

Restrictions

No trees and shrubs shall be planted nor shall permanent structures be erected within 10m of either side of the proposed drain without prior written permission of Council. Attention is also drawn to Sections 80 and 82 of the Drainage Act, which refer to the removal of obstructions in a drain and damage caused to a drain.

Agricultural Grant

If available, it is recommended that application for subsidy be made for eligible agricultural properties. Any assessments against non-agricultural properties are shown separately in the Schedule of Assessment.

The increased cost to design to a higher standard beyond the 38mm / 24 hrs coefficient using the Subsurface Drainage Coefficient Design Methods and the cost to remove a secondary access culvert have been assessed as a special benefit assessment to the properties. This amount will not be eligible for grant.

Maintenance

The Lockhart Drain "A" shall be repaired and maintained as per the "Schedule of Maintenance – Lockhart Drain "A"". The Lockhart Drain "D" shall be repaired and maintained as per the "Schedule of Assessment for Lockhart Drain "D", less any Special Benefit Assessments.

Both drainage works shall be maintained as per the specifications and drawings contained in this Engineer's Report.

The additional costs as a result of a road or utility shall be assessed to the owner of the road or utility as per Section 26 of the Drainage Act.

Properties that wish to have the excavated material trucked shall be assessed the cost of trucking less the cost of levelling. The cost of levelling shall form part of the drain maintenance cost.

All the culverts, as included in the profile with rip rap end walls, shall be maintained and repaired in the following manner:

Culvert Number	Benefiting Lands	Road Authority	Upstream Based on Equivalent Hectares as Contained in the SofM
1, 2, 3, 5, 7, 8, 9, 10, 11	50%		50%
4, 7, 12		100%	
6	63%		37%

If a Landowner requests an additional length of culvert beyond that required to have an 8m top width the extra cost shall be borne by the Landowner making the request including the future maintenance and repair. The location of the 8m top width shall be determined by the Drainage Superintendent and shall generally be in the primary access location and shall include any headwalls. If concrete block end walls are used the standard-length culvert to provide an 8m top width shall be 10m.

The Lockhart Drain "E" outside of a Right of Way shall be maintained and repaired with 70% assessed to the property with Roll Number 000-060-071 and the remainder assessed to the property with Roll Number 000-060-080.

The cost of an asphalt surface across any of the culverts shall be assessed to the benefitting property.

If the owner of the property does not remove the existing access culvert at Station 3+065 or repair the channel to the satisfaction of the Drainage Superintendent the repair and/or removal shall be completed with 100% of the cost assessed to the property.

Each property is allowed one access culvert for each municipal drain with any second culvert on the property maintained and repaired 100% by the owner.

Yours truly,

Josh Warner, P. Eng.
R. Dobbin Engineering Inc

Lockhart Drain "A" and "D"
Municipality of North Middlesex
April 26, 2024

ALLOWANCES

Allowances have been made as per Sections 29 & 30 of the Drainage Act for Right of Way and damages to lands and crops.

Conc.	Lot or part	Roll No.	Owner	Section 29 ($) (R.O.W)	Section 30 ($) Damages	Total ($)
Lockhart Drain "A"						
7 ECR	E1/2 Lot 2	000-040-084	Roelands Farms Parkhill Ltd.		630	630
	W 1/2 Lot 3	000-040-083	Conservation Authority Ausable Bayfield		110	110
	E 1/2 Lot 3	000-040-082	R. & G. Falck		360	360
	Lot 4	000-040-081	W. & C. Toonen		900	900
7 WCR	Lot 3 & E 1/4 Lot 4	000-060-079	Bradley Masschelein Farms Ltd		1,440	1,440
	W 3/4 Lot 4 & Lot 5	000-060-080	A. & A. Kustermans		520	520
Lockhart Drain "D"						
7 ECR	Lot 1	000-040-086	Porkhill Farms Ltd		100	100
	W 1/2 Lot 2	000-040-085	B. & M. Ritchie		390	390
	E1/2 Lot 2	000-040-084	Roelands Farms Parkhill Ltd.		840	840
7 WCR	Lot 1	000-060-077	Porkhill Farms Ltd & D. Ritchie		1,440	1,440
	Lot 2	000-060-078	G. Ritchie		920	920
	Pt. Lot 2	000-060-078-01	B. & M. Ritchie		300	300
	Lot 3 & E 1/4 Lot 4	000-060-079	Bradley Masschelein Farms Ltd		1,780	1,780
	W 3/4 Lot 4 & Lot 5	000-060-080	A. & A. Kustermans		1,460	1,460
			TOTAL ALLOWANCES	-	11,190	11,190

Estimate of Cost

	Quantity	Unit	Unit Cost	Total Cost
Pre-Construction Meeting	1	LS	300	300
Restoration/Seeding	1	LS	2,000	2,000
Lockhart Drain "A"				
Culvert No. 6 (Masschelein, Station 2+232)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	1,200	1,200
Supply and Install 2230x1700mmø CSPA c/w Bedding (3.5mm Thick)	19	m	1,600	30,400
Supply and Install Granular "B" Type II	180	tonne	30	5,400
Supply and Install 100% Crushed Granular "A"	25	tonne	35	875
Supply and Install Rip Rap at End Walls	30	tonne	150	4,500
Remove existing Culvert and Excavated Material and Repair Channel (Masschelein, Station 2+605)	1	LS	2,000	2,000
Culvert No. 7 (Grieves Road, Station 3+765)				
Traffic Control	1	LS	3,000	3,000
Daylight and Work Around Watermain	1	LS	1,000	1,000
Daylight, Work Around and Relocate Telecom	1	LS	1,000	1,000
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	4,000	4,000
Supply and Install 2200mmø CSP c/w Bedding (3.5mm Thick)	20	m	1,500	30,000
Supply and Install Granular "B" Type II	250	tonne	30	7,500
Supply and Install 100% Crushed Granular "M" Dolomite	50	tonne	40	2,000
Supply and Install Rip Rap End Walls	45	tonne	150	6,750
Restoration and Ditch Grading	1	LS	1,000	1,000
Culvert No. 9 (Conservation Authority, Station 4+659)				
Brushing and Tree Removal to Access Culvert and Construct Low Level Crossing	1	LS	2,000	2,000
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	2,000	2,000
Excavation and Disposal of Material to Shape Banks and Channel Bottom	1	LS	500	500
Clear Stone Bedding	40	tonne	35	1,400
4' x 10' Hog Slats	8	each	350	2,800
Supply and Install Rip Rap End Walls	25	tonne	150	3,750
Restoration	1	LS	500	500
Culvert No. 10 (Falck, Station 4+944)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	1,200	1,200
Supply and Install 1600mmø CSP c/w Bedding (2.8mm Thick)	11	m	1,000	11,000
Supply and Install Granular "B" Type II	100	tonne	30	3,000
Supply and Install 100% Crushed Granular "A"	25	tonne	35	875
Supply and Install Rip Rap at End Walls	30	tonne	150	4,500

	Quantity	Unit	Unit Cost	Total Cost
Culvert No. 11 (Toonen, Station 5+315)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	1,200	1,200
Supply and Install 1600mmø CSP c/w Bedding (2.8mm Thick)	19	m	1,000	19,000
Supply and Install Granular "B" Type II	250	tonne	30	7,500
Supply and Install 100% Crushed Granular "A"	25	tonne	35	875
Supply and Install Rip Rap at End Walls	40	tonne	150	6,000
Excavation of Open Channel and Levelling (Station 1+650 to 1+925)	275	LS	30	8,250
Excavation of Open Channel and Levelling (Station 5+315 to 5+347)	32	LS	30	960
Rip Rap for Newbury Weir Downstream of Culvert No. 11	20	tonne	150	3,000
Silt Fences	3	each	200	600
Drain "D"				
Locate and Abandon Existing Tile Drain	1	LS	2,500	2,500
Locate and Work Around Watermain near Station 0+000	1	LS	1,500	1,500
Strip and Level Topsoil and Gravel for Tile Drain (0+000 to 2+621)	2621	m	6	15,726
6m of 600mmø HDPE Outlet Pipe c/w Rodent Grate	1	LS	1,800	1,800
Rip Rap at Tile Outlet and Basins	80	tonne	150	12,000
600mmø Concrete Tile	1118	m	90	100,620
525mmø Concrete Tile	838	m	80	67,040
350mmø Concrete Tile	620	m	55	34,100
600mmø HDPE Pipe	24	m	300	7,200
100% Crushed Granular "A" at Driveways	40	tonne	40	1,600
Remove Existing Catch Basins (Station 0+290, 1+148, 1+986, 2+001 and 2+621)	5	ea	500	2,500
Remove Existing Concrete Bridge at Station 0+679	1	LS	1,200	1,200
Remove Existing Hickenbottom (Station 0+405)	1	ea	300	300
JB #1 (900mm x 1200mm) c/w Connections	1	LS	2,500	2,500
CB #2 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #3 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #4 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000

	Quantity	Unit	Unit Cost	Total Cost
CB #5 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #6 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #7 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #9 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
Locate and Connect Existing Field Tile	70	ea	100	7,000
Grieves Road				
Traffic Control	1	LS	800	800
Locate and Work Around Utilities	1	LS	3,000	3,000
Remove Existing Tile and Unsuitable Backfill Material	1	LS	3,500	3,500
450mmø HDPE Smooth Wall Pipe (Open Cut) c/w Bedding	15	m	450	6,750
Supply and Install Granular "A"	150	tonne	30	4,500
Supply and Install 100% Crushed Granular "M" Dolomite	25	tonne	40	1,000
Restoration and Ditch Grading	1	LS	1,000	1,000
Silt Fence	1	ea	200	200
Miscellaneous/Contingency				24,300

Sub Total	$507,471
Allowances	$11,190
Engineering	$63,730
Future Culvert Design	$8,400
Locating Tile Drain	$800
Engineering to Update Profile and SofM for Drain "A"	$6,800
Daylighting and Surveying Utilities	$5,000
Estimate for Tendering, Contract Administration and Inspection	$38,000
ABCA Fee	$500
Sub Total	**$641,891**
Non-Recoverable HST (1.76%)	$11,297
Total Estimate	**$653,188**

SCHEDULE OF ASSESSMENT FOR LOCKHART DRAIN "A"

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Special Benefit	Benefit	Outlet	Total
Agricultural Lands								
5 ECR	Lot 4	4.86	000-040-025	1633552 Ontario Inc		-	1,562	1,562
	Lot 5	2.83	000-040-023	W. & C. Toonen		-	909	909
6 ECR	Lot 4	17.40	000-040-033	Roelands Farms Parkhill Ltd.		-	2,795	2,795
	Lot 5	40.06	000-040-035	Roelands Farms Parkhill Ltd.		156	12,872	13,028
	Lot 6	33.18	000-040-036	Frank Vanderkant & Family Limited		-	10,662	10,662
7 ECR	Lot 1	30.76	000-040-086	Porkhill Farms Ltd		258	2,134	2,392
	W 1/2 Lot 2	16.99	000-040-085	B. & M. Ritchie		129	1,194	1,323
	E1/2 Lot 2	19.42	000-040-084	Roelands Farms Parkhill Ltd.		729	1,375	2,104
	E 1/2 Lot 3	20.23	000-040-082	R. & G. Falck		13,177	1,811	14,988
	Lot 4	38.04	000-040-081	W. & C. Toonen		20,077	9,240	29,317
	Lot 5	40.47	000-040-080	837069 Ontario Inc		129	12,898	13,027
	Lot 6	34.40	000-040-079	Denys Farms Inc.		-	10,996	10,996
6 WCR	Lot 2	2.83	000-060-074	D. Vanderkant & Frank Vanderkant & Family Limited		-	14	14
	Lot 3	2.43	000-060-073	Frank Vanderkant & Family Limited		-	12	12
	Lot 4	2.83	000-060-072	J. Mollard		-	14	14
	Lot 5	0.81	000-060-071	CBC Macgregor Farms Ltd		-	4	4
7 WCR	Lot 1	31.97	000-060-077	Porkhill Farms Ltd & D. Ritchie		258	2,192	2,450
	Lot 2	34.80	000-060-078	G. Ritchie		258	2,361	2,619
	Pt. Lot 2	0.80	000-060-078-01	B. & M. Ritchie		-	53	53
	Lot 3 & E 1/4 Lot 4	47.75	000-060-079	Bradley Masschelein Farms Ltd	2,480	28,098	3,199	33,777
	W 3/4 Lot 4 & Lot 5	70.81	000-060-080	A. & A. Kustermans		1,023	333	1,356
	Lot 6	37.63	000-060-082	W. Mitchell		258	143	401
	Pt. Lot 6	1.62	000-060-081	D. & J. Masfrankc		-	7	7
	Lot 7	32.37	000-060-083	A. Mollard		858	93	951
	E 1/2 Lot 8	8.09	000-060-084	B. & M. Ritchie		729	17	746
	W 1/2 Lot 8	4.05	000-060-085	B. Ritchie		129	4	133
	E 1/2 Lot 9	0.00	000-060-086	M. & K. Whiting		650	-	650
8 WCR	Lot 4	5.66	000-070-009	D. & M. Ritchie		-	29	29
	E 1/2 Lot 4	3.64	000-070-008	D. & M. Pork Inc.		-	15	15
	W 1/2 Lot 4	3.24	000-070-007	R. McFalls		-	14	14
	Lot 6	6.07	000-070-006	N. & L. Eagleson		-	24	24
					2,480	66,916	76,976	146,372

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Special Benefit	Benefit	Outlet	Total
Non Agricultural Lands								
7 ECR	W 1/2 Lot 3	20.23	000-040-083	Conservation Authority Ausable Bayfield		8,280	1,441	9,721
6 ECR	Pt. Lot 5	0.40	000-040-034	P. Roelands & H. Oosterhof		-	170	170
7 WCR	Pt. Lot 8	0.40	000-060-085-01	K. Mathers		-	2	2
					-	8,280	1,613	9,893
Municipal Lands								
Grand Bend Road		4.47		County of Middlesex		1,200	57	1,257
West Corners Drive		7.12		Municipality of North Middlesex		1,200	1,444	2,644
Grieves Road		1.59		Municipality of North Middlesex	67,502	-	221	67,723
Godkin Road		4.25		Municipality of North Middlesex		-	2,726	2,726
					67,502	2,400	4,448	74,350
Utilties								
Watermain				OCWA (Municipality of North Middlesex)	2,050	-	-	2,050
Telecom				Bell Telecom	2,050	-	-	2,050
					4,100	-	-	4,100

Total - Utilities	4,100
Total - Agricultural Lands	146,372
Total - Non - Agricultural Lands	9,893
Total - Municipal Lands	74,350
Total Assessment	$234,715

SCHEDULE OF ASSESSMENT FOR LOCKHART DRAIN "D"

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Special Benefit	Benefit	Outlet	Total
Agricultural Lands								
7 ECR	Lot 1	6.10	000-040-086	Porkhill Farms Ltd	3,953	13,703	33,400	51,056
	W 1/2 Lot 2	2.60	000-040-085	B. & M. Ritchie	2,144	8,812	19,712	30,668
	E1/2 Lot 2	1.70	000-040-084	Roelands Farms Parkhill Ltd.		1,217	12,889	14,106
6 WCR	Lot 2	2.83	000-060-074	D. Vanderkant & Frank Vanderkant & Family Limited		-	4,505	4,505
	Lot 3	2.43	000-060-073	Frank Vanderkant & Family Limited		-	2,850	2,850
	Lot 4	2.83	000-060-072	J. Mollard		-	413	413
7 WCR	Lot 1	10.10	000-060-077	Porkhill Farms Ltd & D. Ritchie	5,910	25,582	37,516	69,008
	Lot 2	12.60	000-060-078	G. Ritchie	3,344	23,235	25,171	51,750
	Pt. Lot 2	0.80	000-060-078-01	B. & M. Ritchie	1,003	5,992	855	7,850
	Lot 3 & E 1/4 Lot 4	16.30	000-060-079	Bradley Masschelein Farms Ltd	5,291	38,674	18,217	62,182
	W 3/4 Lot 4 & Lot 5	6.50	000-060-080	A. & A. Kustermans	6,510	37,063	4,372	47,945
					28,156	154,278	159,900	342,334
Municipal Lands								
West Corners Drive		5.40		Municipality of North Middlesex		-	27,824	27,824
Grieves Road		0.50		Municipality of North Middlesex	28,326	-	4,599	32,925
					28,326	-	32,423	60,749
Utilties								
Watermain				OCWA (Municipality of North Middlesex)	12,840	-	-	12,840
Telecom				Bell Telecom	2,550	-	-	2,550
					15,390	-	-	15,390
			Total - Utilities		15,390			
			Total - Agricultural Lands		342,334			
			Total - Municipal Lands		60,749			
			Total Assessment		$418,473			

COMPOSITE SCHEDULE OF ASSESSMENT

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Special Benefit	Benefit	Outlet	Total
Agricultural Lands								
5 ECR	Lot 4	4.86	000-040-025	1633552 Ontario Inc	-	-	1,562	1,562
	Lot 5	2.83	000-040-023	W. & C. Toonen	-	-	909	909
6 ECR	Lot 4	17.40	000-040-033	Roelands Farms Parkhill Ltd.	-	-	2,795	2,795
	Lot 5	40.06	000-040-035	Roelands Farms Parkhill Ltd.	-	156	12,872	13,028
	Lot 6	33.18	000-040-036	Frank Vanderkant & Family Limited	-	-	10,662	10,662
7 ECR	Lot 1	30.76	000-040-086	Porkhill Farms Ltd	3,953	13,961	35,534	53,448
	W 1/2 Lot 2	16.99	000-040-085	B. & M. Ritchie	2,144	8,941	20,906	31,991
	E1/2 Lot 2	19.42	000-040-084	Roelands Farms Parkhill Ltd.	-	1,946	14,264	16,210
	E 1/2 Lot 3	20.23	000-040-082	R. & G. Falck	-	13,177	1,811	14,988
	Lot 4	38.04	000-040-081	W. & C. Toonen	-	20,077	9,240	29,317
	Lot 5	40.47	000-040-080	837069 Ontario Inc	-	129	12,898	13,027
	Lot 6	34.40	000-040-079	Denys Farms Inc.	-	-	10,996	10,996
6 WCR	Lot 2	2.83	000-060-074	D. Vanderkant & Frank Vanderkant & Family Limited	-	-	4,519	4,519
	Lot 3	2.43	000-060-073	Frank Vanderkant & Family Limited	-	-	2,862	2,862
	Lot 4	2.83	000-060-072	J. Mollard	-	-	427	427
	Lot 5	0.81	000-060-071	CBC Macgregor Farms Ltd	-	-	4	4
7 WCR	Lot 1	31.97	000-060-077	Porkhill Farms Ltd & D. Ritchie	5,910	25,840	39,708	71,458
	Lot 2	34.80	000-060-078	G. Ritchie	3,344	23,493	27,532	54,369
	Pt. Lot 2	0.80	000-060-078-01	B. & M. Ritchie	1,003	5,992	908	7,903
	Lot 3 & E 1/4 Lot 4	47.75	000-060-079	Bradley Masschelein Farms Ltd	7,771	66,772	21,416	95,959
	W 3/4 Lot 4 & Lot 5	70.81	000-060-080	A. & A. Kustermans	6,510	38,086	4,705	49,301
	Lot 6	37.63	000-060-082	W. Mitchell	-	258	143	401
	Pt. Lot 6	1.62	000-060-081	D. & J. Masfrankc	-	-	7	7
	Lot 7	32.37	000-060-083	A. Mollard	-	858	93	951
	E 1/2 Lot 8	8.09	000-060-084	B. & M. Ritchie	-	729	17	746
	W 1/2 Lot 8	4.05	000-060-085	B. Ritchie	-	129	4	133
	E 1/2 Lot 9	0.00	000-060-086	M. & K. Whiting	-	650	-	650
8 WCR	Lot 4	5.66	000-070-009	D. & M. Ritchie	-	-	29	29
	E 1/2 Lot 4	3.64	000-070-008	D. & M. Pork Inc.	-	-	15	15
	W 1/2 Lot 4	3.24	000-070-007	R. McFalls	-	-	14	14
	Lot 6	6.07	000-070-006	N. & L. Eagleson	-	-	24	24
					30,636	221,194	236,876	488,706

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Special Benefit	Benefit	Outlet	Total
Non Agricultural Lands								
7 ECR	W 1/2 Lot 3	20.23	000-040-083	Conservation Authority Ausable Bayfield	-	8,280	1,441	9,721
6 ECR	Pt. Lot 5	0.40	000-040-034	P. Roelands & H. Oosterhof	-	-	170	170
7 WCR	Pt. Lot 8	0.40	000-060-085-01	K. Mathers	-	-	2	2
					-	8,280	1,613	9,893
Municipal Lands								
Grand Bend Road		4.47		County of Middlesex	-	1,200	57	1,257
West Corners Drive		7.12		Municipality of North Middlesex	-	1,200	29,268	30,468
Grieves Road		1.59		Municipality of North Middlesex	95,828	-	4,820	100,648
Godkin Road		4.25		Municipality of North Middlesex	-	-	2,726	2,726
					95,828	2,400	36,871	135,099
Utilities								
Watermain				OCWA (Municipality of North Middlesex)	14,890	-	-	14,890
Telecom				Bell Telecom	4,600	-	-	4,600
					19,490	-	-	19,490

Total - Utilities	19,490
Total - Agricultural Lands	488,706
Total - Non - Agricultural Lands	9,893
Total - Municipal Lands	135,099
Total Assessment	$653,188

ESTIMATED NET ASSESSMENT

Net assessment subject to OMAFRA ADIP Policy and actual construction costs.

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Lockhart Drain "A" Assessment	Estimated Grant	Allowances	Net Assessment	Lockhart Drain "D" Assessment	Estimated Grant	Allowances	Net Assessment	Total Estimated Net Assessmnet
Agricultural Lands													
5 ECR	Lot 4	4.86	000-040-025	1633552 Ontario Inc	1,562	521		1,041					1,041
	Lot 5	2.83	000-040-023	W. & C. Toonen	909	303		606					606
6 ECR	Lot 4	17.4	000-040-033	Roelands Farms Parkhill Ltd.	2,795	932		1,863					1,863
	Lot 5	40.06	000-040-035	Roelands Farms Parkhill Ltd.	13,028	4,343		8,685					8,685
	Lot 6	33.18	000-040-036	Frank Vanderkant & Family Limited	10,662	3,554		7,108					7,108
7 ECR	Lot 1	30.76	000-040-086	Porkhill Farms Ltd	2,392	797		1,595	51,056	15,701	100	35,255	36,850
	W 1/2 Lot 2	16.99	000-040-085	B. & M. Ritchie	1,323	441		882	30,668	9,508	390	20,770	21,652
	E1/2 Lot 2	19.42	000-040-084	Roelands Farms Parkhill Ltd.	2,104	701	630	773	14,106	4,702	840	8,564	9,337
	E 1/2 Lot 3	20.23	000-040-082	R. & G. Falck	14,988	4,996	360	9,632					9,632
	Lot 4	38.04	000-040-081	W. & C. Toonen	29,317	9,772	900	18,645					18,645
	Lot 5	40.47	000-040-080	837069 Ontario Inc	13,027	4,342		8,685					8,685
	Lot 6	34.4	000-040-079	Denys Farms Inc.	10,996	3,665		7,331					7,331
6 WCR	Lot 2	2.83	000-060-074	D. Vanderkant & Frank Vanderkant & Family Limited	14	5		9	4,505	1,502		3,003	3,012
	Lot 3	2.43	000-060-073	Frank Vanderkant & Family Limited	12	4		8	2,850	950		1,900	1,908
	Lot 4	2.83	000-060-072	J. Mollard	14	5		9	413	138		275	284
	Lot 5	0.81	000-060-071	CBC Macgregor Farms Ltd	4	1		3	-	-		-	3
7 WCR	Lot 1	31.97	000-060-077	Porkhill Farms Ltd & D. Ritchie	2,450	817		1,633	69,008	21,033	1,440	46,535	48,168
	Lot 2	34.8	000-060-078	G. Ritchie	2,619	873		1,746	51,750	16,135	920	34,695	36,441
	Pt. Lot 2	0.8	000-060-078-01	B. & M. Ritchie	53	18		35	7,850	2,282	300	5,268	5,303
	Lot 3 & E 1/4 Lot	47.75	000-060-079	Bradley Masschelein Farms Ltd	33,777	10,432	1,440	21,905	62,182	18,964	1,780	41,438	63,343
	W 3/4 Lot 4 & Lot	70.81	000-060-080	A. & A. Kustermans	1,356	452	520	384	47,945	13,812	1,460	32,673	33,057
	Lot 6	37.63	000-060-082	W. Mitchell	401	134		267					267
	Pt. Lot 6	1.62	000-060-081	D. & J. Masfrankc	7	2		5					5
	Lot 7	32.37	000-060-083	A. Mollard	951	317		634					634
	E 1/2 Lot 8	8.09	000-060-084	B. & M. Ritchie	746	249		497					497
	W 1/2 Lot 8	4.05	000-060-085	B. Ritchie	133	44		89					89
	E 1/2 Lot 9	0	000-060-086	M. & K. Whiting	650	217		433					433
8 WCR	Lot 4	5.66	000-070-009	D. & M. Ritchie	29	10		19					19
	E 1/2 Lot 4	3.64	000-070-008	D. & M. Pork Inc.	15	5		10					10
	W 1/2 Lot 4	3.24	000-070-007	R. McFalls	14	5		9					9
	Lot 6	6.07	000-070-006	N. & L. Eagleson	24	8		16					16
Non-Agricultural Lands													
7 ECR	W 1/2 Lot 3	20.23	000-040-083	Conservation Authority Ausable Bayfield	9,721		110	9,611				-	9,611
6 ECR	Pt. Lot 5	0.4	000-040-034	P. Roelands & H. Oosterhof	170			170					170
7 WCR	Pt. Lot 8	0.4	000-060-085-01	K. Mathers	2			2					2
Municipal Lands													
Grand Bend Road				County of Middlesex	1,257			1,257					1,257
West Corners Drive				Municipality of North Middlesex	2,644			2,644	27,824			27,824	30,468
Grieves Road				Municipality of North Middlesex	67,723			67,723	32,925			32,925	100,648
Godkin Road				Municipality of North Middlesex	2,726			2,726					2,726
Utilities													
Watermain				OCWA (Municipality of North Middlesex)	2,050			2,050	12,840			12,840	14,890
Telecom				Bell Telecom	2,050			2,050	2,550			2,550	4,600
				Total Assessment	$234,715	$47,965	$3,960	$182,790	$418,473	$104,727	$7,230	$306,516	$489,306

SCHEDULE OF MAINTENANCE - LOCKHART DRAIN "A"

To Maintain the Open Channel Portion of Drain "A" from Station 0+000 to 6+190

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Benefit	Outlet	Total	Equivalent Ha.
Agricultural Lands								
5 ECR	Lot 4	4.86	000-040-025	1633552 Ontario Inc	-	85	85	1.46
	Lot 5	2.83	000-040-023	W. & C. Toonen	-	49	49	0.85
6 ECR	Lot 4	17.40	000-040-033	Roelands Farms Parkhill Ltd.	-	152	152	2.61
	Lot 5	40.06	000-040-035	Roelands Farms Parkhill Ltd.	229	700	929	12.02
	Lot 6	33.18	000-040-036	Frank Vanderkant & Family Limited	-	580	580	9.95
7 ECR	Lot 1	30.76	000-040-086	Porkhill Farms Ltd	379	214	593	9.23
	W 1/2 Lot 2	16.99	000-040-085	B. & M. Ritchie	189	141	330	5.10
	E1/2 Lot 2	19.42	000-040-084	Roelands Farms Parkhill Ltd.	189	175	364	5.83
	E 1/2 Lot 3	20.23	000-040-082	R. & G. Falck	189	179	368	5.06
	Lot 4	38.04	000-040-081	W. & C. Toonen	379	437	816	11.41
	Lot 5	40.47	000-040-080	837069 Ontario Inc	189	552	741	12.14
	Lot 6	34.40	000-040-079	Denys Farms Inc.	-	517	517	10.32
6 WCR	Lot 2	2.83	000-060-074	D. Vanderkant & Frank Vanderkant & Family Limited	-	8	8	0.85
	Lot 3	2.43	000-060-073	Frank Vanderkant & Family Limited	-	7	7	0.73
	Lot 4	2.83	000-060-072	J. Mollard	-	8	8	0.85
	Lot 5	0.81	000-060-071	CBC Macgregor Farms Ltd	-	2	2	0.24
7 WCR	Lot 1	31.97	000-060-077	Porkhill Farms Ltd & D. Ritchie	379	184	563	9.59
	Lot 2	34.80	000-060-078	G. Ritchie	379	163	542	10.44
	Pt. Lot 2	0.80	000-060-078-01	B. & M. Ritchie	-	2	2	0.24
	Lot 3 & E 1/4 Lot 4	47.75	000-060-079	Bradley Masschelein Farms Ltd	476	164	640	14.33
	W 3/4 Lot 4 & Lot 5	70.81	000-060-080	A. & A. Kustermans	622	145	767	21.24
	Lot 6	37.63	000-060-082	W. Mitchell	379	51	430	11.29
	Pt. Lot 6	1.62	000-060-081	D. & J. Masfrankc	-	3	3	0.49
	Lot 7	32.37	000-060-083	A. Mollard	379	23	402	9.71
	E 1/2 Lot 8	8.09	000-060-084	B. & M. Ritchie	189	3	192	2.43
	W 1/2 Lot 8	4.05	000-060-085	B. Ritchie	189	-	189	1.22
	E 1/2 Lot 9	0.00	000-060-086	M. & K. Whiting	73	-	73	0.00
8 WCR	Lot 4	5.66	000-070-009	D. & M. Ritchie	-	19	19	1.70
	E 1/2 Lot 4	3.64	000-070-008	D. & M. Pork Inc.	-	7	7	1.09
	W 1/2 Lot 4	3.24	000-070-007	R. McFalls	-	7	7	0.97
	Lot 6	6.07	000-070-006	N. & L. Eagleson	-	10	10	1.82
					4,808	4,587	9,395	

Conc.	Lot or Part	Affected Hect.	Roll No.	Owner	Benefit	Outlet	Total	Equivalent Ha.
Non Agricultural Lands								
7 ECR	W 1/2 Lot 3	20.23	000-040-083	Conservation Authority Ausable Bayfield	189	132	321	4.05
6 ECR	Pt. Lot 5	0.40	000-040-034	P. Roelands & H. Oosterhof	-	8	8	0.16
7 WCR	Pt. Lot 8	0.40	000-060-085-01	K. Mathers	-	1	1	0.16
					189	141	330	
Municipal Lands								
Grand Bend Road		4.47		County of Middlesex	-	27	27	4.02
West Corners Drive		7.12		Municipality of North Middlesex	-	85	85	4.27
Grieves Road		1.59		Municipality of North Middlesex	-	22	22	0.95
Godkin Road		4.25		Municipality of North Middlesex	-	141	141	2.55
					-	275	275	

Total - Agricultural Lands	9,395
Total - Non - Agricultural Lands	330
Total - Municipal Lands	275
Total Assessment	$10,000

Lockhart Drain “A” and “D”
Municipality of North Middlesex
April 26, 2024

SPECIFICATION OF WORK

1. Location

The work in this specification is located from Lot 9, Concession 7 WCR to Lot 5, ECR on the Lockhart Drain “A” and “D” in The Municipality of North Middlesex.

2. Scope of Work

The work included in this specification includes, but is not limited to, the following:

- Proposed Works
    - Five Access Culvert Replacements (Culvert No. 6, 8, 9, 10 and 11)
    - One Road Culvert Replacement (Culvert No. 7)
    - Culvert Removal at Stations 2+605
    - 307m of Channel Improvements complete with Newbury Weir
    - 2,621m of Tile Drain Replacement complete with catch basins

- Future Works
    - Channel Works
    - Culvert Replacements
    - Tile Drain Replacement

3. General

Each tenderer must inspect the site prior to submitting their tender and satisfy themselves by personal examination as to the local conditions that may be encountered during this project. The Contractor shall make allowance in their tender for any difficulties which they may encounter. Quantities or any information supplied by the Engineer is not guaranteed and is for reference only.

All work and materials shall be to the satisfaction of the Drainage Superintendent who may vary these specifications as to minor details but in no way decrease the proposed capacity of the drain.

The Contractor shall be responsible for the notification of all utilities prior to the start of construction.

Measurement for Payment Clauses have not been included in these specifications and will be part of the Construction document. If the Construction document has not identified Measurement for Payment Clauses, the Contractor must notify the Municipality of North Middlesex and request clarification 2 days prior to pricing the project

4. Plans and Specifications

This Specification of Work shall take precedence over all plans and general conditions pertaining to the Contract. The Contractor shall provide all labour, equipment, and supervision necessary to complete the work as shown in the Plans and described in these specifications. Any work not described in these specifications shall be completed according to the Ontario Provincial Standard Specifications and Standard Drawings.

5. Health and Safety

The Contractor at all times shall be responsible for health and safety on the worksite including ensuring that all employees wear suitable personal protective equipment including safety boots and hard hats.

When applicable the Contractor shall be responsible for traffic control as per the Ontario Traffic Manual Book 7 – Temporary Conditions (latest revision).

The Contractor shall be responsible to ensure that all procedures are followed under the Occupational Health and Safety Act to ensure that work sites are safe and that accidents are prevented. In the event of a serious or recurring problem, a notice of non-compliance will be issued. The Contractor will be responsible for reacting immediately to any deficiency and correcting any potential health and safety risk. Continuous disregard for any requirement of the Occupational Health and Safety Act could be cause for the issuance of a stop work order or even termination of the Contract.

The Contractor shall also ensure that only competent workers are employed onsite and that appropriate training and certification is supplied to all employees.

6. Utilities

The Contractor is responsible for organizing locates and exposing all the utilities along the length of the drainage works. If any utilities interfere with the proposed drainage works in a manner not shown on the accompanying Estimate of Cost or profile the Contractor shall notify the Drainage Superintendent and Engineer.

The Contractor is responsible for coordinating the replacement of additional utilities with the utility company if they interfere with the proposed drain. All costs for the utility to replace their services will be outside of this report and shall be borne by the utility as per Section 26 of the Drainage Act.

All additional costs to work around and organize replacement of the utilities not included in the estimate shall be tracked separately and the cost plus a portion of the engineering (25% of the cost) shall be borne by that utility.

There is an existing watermain on the property with Roll Number 000-060-080 that shall be located prior to cleaning out the channel and the installation of Branch “D”. Drawings of the watermain are included at the end of this report. The outlet of Branch “D” shall be east of the watermain.

7. Traffic Control

Access and driveways to private properties shall not be obstructed longer than the minimum time necessary for the work and shall be reinstated as soon as possible all to the satisfaction of the Engineer. The contractor shall schedule any obstruction of existing driveways with the owners at least two full working days in advance. The Traffic Plan must be approved by the Municipality prior to the commencement of any road closures.

a) The Contractor shall supply, erect and maintain all detour signs and special signs necessary for detours to divert traffic from the area under construction as directed by the Road Superintendent or Engineer. All this work shall be at the Contractor’s expense.

b) The Contractor shall be responsible for supplying, erecting and maintaining all signs, supports, barricades, flashers, cones, etc. in the construction area and at the boundaries of the work as part of the above detours, all to the satisfaction of the Engineer or Drainage Superintendent. All this work shall be done by the Contractor at their own expense.

c) The Contractor shall not be allowed to proceed with construction activities unless proper signage and flagmen are present. Flagging procedures, signage and detours shall conform to the recommendations of Book 7, Temporary Conditions, Ontario Traffic Manual, issued by the Ministry of Transportation. Conformance shall be enforced by the Ministry of Labour Inspector.

8. Pre-Construction Meeting

There is a requirement for a pre-construction meeting to be held prior to any construction taking place. The meeting shall be scheduled by the Contractor. The Landowners, Engineer, and the Municipality of North-Middlesex shall be notified of the pre-construction meeting at least 48 hours prior.

9. Access and Working Area

Lockhart Drain "A"

Construction:

Access to the work site for the proposed work on the Lockhart Drain "A" shall be from West Corner Drive and within the property the improvements are located, except for the replacement of the culvert on the property with Roll Number 00-040-083. For this access culvert, access shall be gained from the property with the Roll Number 000-040-084, along the existing access and along the length of the drainage works. All access shall be restricted to a width of 6 metres and shall generally be along fence lines, and existing access laneways.

The working area for the construction at each culvert and for any channel improvements shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert or improvements.

Maintenance:

Access for culvert maintenance and channel repair on a single property shall be from the properties in which the culvert or channel is being repaired or maintained. If maintenance is being done on multiple properties access shall be gained from the nearest roadway and shall be along the length of the drainage works. The working area at each culvert shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert. The working area for channel maintenance shall be restricted to a width of 10m from the side the excavation is taking place. The channel shall generally be excavated from the south side of the channel unless otherwise determined by the Drainage Superintendent. If, at the discretion of the Drainage Superintendent, there is erosion on the channel opposite the working area access may be gained along the channel and nearest culvert to maintain the bank.

The working area for future maintenance at each culvert shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert.

Lockhart Drain "D"

Access to the work site for construction and future maintenance shall be from West Corner Drive and Grieves Road and along the length of the drainage works. Access shall generally be restricted to a width of 6 metres and shall be along existing access laneways.

The working area for the construction and future maintenance of the proposed tile drain shall be restricted to a width of 20m along the length of the drainage works normally centred on the proposed tile drain.

10. Benchmarks

The benchmarks are based on geodetic elevations. Elevations are available at the locations shown on the Plan and Profile drawings. Where these elevations are on existing structures to be replaced, they shall be transferred by the Contractor prior to the removal.

11. Removals

The culverts, catch basins, unsuitable or not required excavated material, etc. shall be removed in their entirely and shall be disposed offsite at the expense of the Contractor. Tile under road crossings shall be removed in their entirety.

Where the culvert is being removed and not replaced the Contractor shall be responsible for repairing the channel. This shall include resloping the banks to match the adjacent (minimum 1.5:1), levelling the excavated material in the field or bush, installation of straw matting and seeding the side slopes.

12. Brushing and Tree Removal

For the tile drain all brush, trees, woody vegetation, stumps etc. shall be removed for a width of 15 metres along the tile drain. They shall be removed in their entirety including stumps.

For the open channel all brush, trees, vegetation, stumps etc. in order to facilitate the excavation of the open channel and culvert construction, as determined by the Drainage Superintendent or Engineer, shall be removed at the discretion of the Drainage Superintendent or Engineer and shall be included as part of this item.

A mechanical grinder attached to an excavator shall be used for the removal of brush and trees. Any brush and trees too large to grind shall be close cut. The Contractor shall stockpile the trees and brush in a single pile on the property in which they were removed or dispose of the trees and brush offsite. The Contractor is responsible for the burning of the trees and brush. The Contractor is responsible for obtaining all necessary permits for any disposal sites. Burning of the trees and brush is subject to local bylaws and guidelines of the Ministry of the Environment Conservation and Parks.

Certain trees may be left in place at the direction of the Drainage Superintendent.

13. Excavation of Open Channel

The open channel shall be excavated and maintained to the depths and grades as per the profile and drawings as contained in this Engineers Report. The channel shall be excavated to the proper depth using a laser or similar approved device with a labourer onsite to ensure correctness of grade and to confirm location of tile ends.

The excavated material shall generally be cast on the side it is being excavated from, except across finished lawns where the excavated material shall be trucked. Excavated material shall be cast at least 1.5 metres clear of the bank. Excavated material shall not be placed in low runs or swales out letting surface water to the channel. The excavated material shall be levelled to a maximum depth of 150mm and left in a condition suitable for cultivation. This shall include the removal of any rocks larger then 10cm in diameter and any debris/wood that could damage or plug farm equipment. Leveling shall occur when the material is dry enough to do so as determined by the Drainage Superintendent or Engineer. All high spots above grade shall be removed. The sediment shall be removed leaving a rounded bottom with the intent not to undercut the existing side slopes. All material unfit for placing on farmlands shall be disposed of offsite by the Contractor.

Where determined by the Drainage Superintendent, the banks are unstable the banks shall be re-sloped to 2:1.

14. Installation of Culverts

The Contractor is required to notify the Landowner forty-eight (48) hours prior to the removal of a culvert.

The Contractor shall supply, install, and backfill aluminized corrugated steel pipe (CSP) with a minimum wall thickness of 2.8mm. Corrugated Steel Pipe Arches and culverts under roadways shall have a minimum wall thickness of 3.5mm. All corrugation profiles shall be of helical lock seam manufacture using 68 x 13mm corrugations for 1600mm dia. pipe and smaller and 125 x 25mm corrugations for 1800mm dia. pipe and larger. Pipe with 125 x 25mm corrugations shall be used if 68 x 13mm corrugations are not available.

The high-density polyethylene (HDPE) smooth wall pipe (320 kPa) shall be CSA Approved with bell and spigot joints.

The culverts designated to be replaced in the future under this report shall be examined after any cleanout of the open channel as to its condition. If it is found to be in disrepair (i.e. there are holes corroded in the bottom or sides) it shall be replaced as per these specifications.

The culverts shall be installed generally in the same location or as approved by the Drainage Superintendent or Engineer. The culverts shall be installed with the invert 10% (minimum 150mm) below the original channel bottom elevation unless otherwise shown in order to achieve the minimum cover. It is the Contractors responsibility to ensure that the minimum cover is achieved when backfilling the culverts. The minimum cover for CSP under Highway Loading shall be 1/6 of the span, and shall be no less than 300mm.

All culverts may have concrete block or rip rap end walls. The access culverts shall be assessed, as per the report, to provide an 8m access width. If an owner requests a longer culvert than that required to achieve an 8m top width, please refer to the report.

Any tile outlets extended as a result of a culvert shall be extended at the landowner's expense. The pipes that shall be extended upstream or downstream of the proposed culvert shall be done with non-perforated HDPE agricultural tubing with a manufactured coupling, elbow and rodent grate.

Access Culverts:

The bottom of the excavation shall be excavated to a minimum of 100mm below the proposed invert. The pipe shall be bedded with ¾" clear stone. When the pipe has been installed to the proper grade and depth, the excavation shall be backfilled with ¾" clear stone and wrapped in filter fabric from the bottom of the excavation to the spring line of the pipe. Care shall be taken to ensure that the backfill on either side of the culvert does not differ by more than 300mm so that the pipe is not displaced. The access culverts shall be backfilled from the spring line to within 150mm of finished grade with Granular "B" Type II. Where no vehicular traffic is proposed to cross the culvert, the culvert may be backfilled with select native material. The top 150mm shall be backfilled with compacted 100% crushed granular "A" material to finished grade. In sections where no vehicular traffic is proposed to cross the culvert, the top 150mm shall be topsoil and seeded as per the restoration specification. If asphalt is proposed, the asphalt shall be HL4 and shall match the existing thickness. In these cases, the compacted granular "A" shall occupy 150mm below the proposed asphalt.

Road Culverts:

The bottom of the excavation shall be excavated to a minimum of 100mm below the proposed invert. The pipe shall be bedded with ¾" clear stone. When the pipe has been installed to the proper grade and depth, the excavation shall be backfilled with ¾" clear stone and wrapped in filter fabric from the spring line of the pipe. Care shall be taken to ensure that the backfill on either side of the culvert does not differ by more than 300mm so that the pipe is not displaced. The pipe shall be backfilled above the clear stone with imported Granular "B" Type II.

Asphalt Road: The sub-base shall consist of a minimum of 300mm of OPS 100% crushed Granular "A". The sub-base material shall not be native material. The asphalt shall be HL4 and HL3 at depths to match the existing thickness.

Gravel Road: The top 200mm shall be OPS Granular "M", produced from 100% crushed dolomite, and shall be mechanically compacted to 100% modified standard proctor density.

The length of culverts specified in the profile are based on utilizing rip rap end walls. If concrete block end walls are proposed the culvert shall be decreased in length accordingly.

If rip rap end walls are used, they shall consist of 150mm x 300mm quarry stone or approved equal. The area to receive the rip rap shall be graded to a depth of 400mm below finished grade. Filter fabric (Mirafi P150 or approved equal) shall then be placed with any joints overlapped a minimum 600mm. The quarry stone shall then be placed with the smaller pieces placed in the gaps and voids to give it a uniform appearance.

If concrete block end walls are used, they shall consist of concrete blocks with dimensions of approx. 600mm x 600mm x 1200mm, 600mm x 600mm x 2400mm or 300mm x 600mm x 1200mm as required. 600mm x 600mm x 2400mm concrete blocks will be paid at twice the unit price established per block, all others will be at a unit of 1. The top of the culvert shall govern block elevation. The correct block shall be set with the top of the block equal to the top of the culvert. 2400mm wide concrete blocks shall be used as the top block on arch and larger round pipes in order to span between the culvert top and the supporting block. The blocks shall be set at each end of the culvert so that each row of blocks will be offset approx. 100mm from the row below. The bottom row shall consist of one block placed parallel to the culvert. The blocks shall be imbedded a minimum of 300mm into each bank and shall extend into the drain bottom to match the pipe invert or below. Erosion protection shall be placed on the banks next to the end walls. The erosion protection shall consist of 150mm x 300mm quarry stone over filter fabric (Mirafi P150 or approved equal). It shall extend 500mm upstream or downstream and from top of bank to top of bank at each end wall.

The blocks shall be placed over a layer of filter fabric (Mirafi P150 or approved equal). The culvert shall be backfilled in conjunction with the placement of the blocks. The gaps between the culvert and the blocks shall be filled with concrete cinder blocks/bricks and mortar to give the end wall a finished appearance.

15. Low Level Crossing

The low level crossing for Culvert No. 9 shall be constructed using 4’ x 10’ hog slats, deemed “seconds” from Stubbe’s Centralia. The hog slats shall be bedded with ¾” clear stone complete with filter fabric. The side slopes shall be protected with 150mm x 300mm rip rap complete with filter fabric. The rip rap shall have a minimum thickness of 400mm.

The picture provides an idea of the proposed structure but is not meant to replace the drawings included as part of this report.

Example of Hog Slot Low Level Crossing

16. Newbury Weir

A Newbury weir shall be installed downstream of culvert No. 11, as per the drawings and in consultation with the Drainage Superintendent or Engineer on-site at the time of construction. The weir shall generally be located with the crest of the weir approximately 3m downstream of the culvert where they are specified. The crest shall be 0.30m high and shall have a 4:1 slope on the upstream side and 20:1 on the downstream side of the crest. The rip rap shall consist of 150mm x 300mm quarry stone or approved equal. The area to receive the rip rap shall be graded to a depth of 300mm below finished grade. Filter fabric (Terrafix 250R or approved equal) shall then be placed with any joints overlapped a minimum 600mm. The quarry stone shall then be placed with the larger pieces placed near the riffle crest and the downstream slope of the riffle. The large rocks on the downstream face shall be 200 to 300mm apart to dissipate energy and create low flow fish passage. Smaller pieces shall be placed in the gaps and voids to give it a uniform appearance and on the surface of the riffle to allow for breaks in the flow that can be followed up by migrating fish.

Newbury Weirs may be installed in the future downstream of sections of the drain with steep grades. They shall be assessed in accordance with the Schedule of Maintenance contained in this report.

17. Locate and Abandon Existing Drain

The existing tile drain shall be exposed at the discretion of the Drainage Superintendent or Engineer and Contractor in order to adequately determine the proposed alignment. The proposed tile drain shall generally run up the existing tile with the existing drain being abandoned until Branch “F”, where it shall then head northerly to the west side of Culvert No. 5.

18. Strip and Place Topsoil

The Contractor shall strip the topsoil for a width of 6m normally centered on the proposed drain. The topsoil shall be stockpiled at the edge of the working allowance for the duration of the tile installation. Once the tile is installed, the Contractor shall level the topsoil over the drain to their pre-construction condition.

19. Installation of Tile

The Contractor shall supply, install, and backfill the specified sizes of tile and pipe to the depths and grades as shown on the drawings.

Concrete tile shall conform to ASTM C412, extra quality. Tile shall have a circular interior and exterior shape.

Where the concrete tile depth is greater than 2.5m the tile shall be 2000D concrete tile and shall be bedded to the spring line with clear stone. The estimated length of 2000D concrete tile required has been shown as a separate item. Clear stone bedding to the spring line shall be included as part of this item.

HDPE pipe shall be CSA Approved smooth wall gasketed pipe with bell and spigot joints (320 kPa) and shall include clear stone bedding to the spring line under gravel driveways and accesses. Under roadways the road crossing specification shall be used.

The tile drain shall run up the existing tile and in the low runs at the basin locations in order maximize the surface water captured by the in-line catch basins. The exact location of tile can be changed under the direction of the Drainage Superintendent or Engineer.

The trenching and laying of the concrete tile shall be done by wheel machine. An excavator must be used in areas of soil instability, unless approved by the Engineer. All tile joints shall be wrapped with a minimum 300mm width of Mirafi P150 (or approved equal) filter fabric. The filter fabric shall be overlapped by 450mm at the top of the tile. The tile shall be laid in straight lines or on smooth gradual curves with a minimum radius or 25m.

Where approved by the Engineer (or specified) concrete tile may be laid in tighter curves by saw cutting joints. The maximum deflection of one concrete tile joint shall be 22 degrees. Turns of greater than 22 degrees shall require the use of manufactured bends (HDPE smooth wall).

Laser control shall be used to ensure proper grades. The grades calculated on the Profile are to the invert of the tile and pipe with allowances to be made by the Contractor for the wall thickness of the tile and pipe. The depths shown and figured are from ground level to the invert of the pipe along the line of the proposed drain. Should an error appear in the figured depth at any station or stations, the grade shall be made to correspond with that shown on the Profile without extra charge.

Wheel Machine

A wheel machine shall be used to excavate the trench to allow for a round bottom. Prior to backfilling, the tile shall be covered manually to a depth of approx. 100mm over the pipe to ensure that the tile and pipe are not displaced by large clumps of earth. The trench shall be backfilled with excavated material free of stones, broken tile or other deleterious material. All stones larger than 100mm in diameter evident immediately after construction shall be picked up by the Contractor and disposed offsite. The Landowners are responsible for stones after that. The material shall be left windrowed over the trench to allow for settlement.

Excavator

When concrete tile is installed with an excavator, the tile must be installed as per the manufacturer's recommendations **complete with bedding to the spring line**. Prior to backfilling, the tile shall be covered manually to a depth of approx. 100mm over the pipe to ensure that the tile and pipe are not displaced by large clumps of earth. The trench shall be backfilled with excavated material free of stones, broken tile or other deleterious material. All stones larger than 100mm in diameter evident immediately after construction shall be picked up by the Contractor and disposed offsite. The Landowners are responsible for stones after that. The material shall be left windrowed over the trench to allow for settlement.

If the land level must be lowered in order to carry out trenching operations, then it is up to the Contractor to determine if it is necessary and include any extra cost involved. They shall first strip the topsoil to its full depth and stockpile it along one side of the working width and then grade the area to allow the trenching to be carried out. All excavated material shall be windrowed on the side opposite the trench that the topsoil is stockpiled. After trenching and backfilling operations are complete, the topsoil shall be spread to its original depth.

All areas disturbed by construction, except the material windrowed over the trench, shall be left in a condition suitable for cultivation.

The Contractor shall not operate any trenching or backfill equipment, delivery trucks or equipment, pickup trucks or other vehicles along or over the trench during or after construction. The Contractor shall be responsible for any damage caused by any equipment or vehicles operated over the trench. If the Contractor must cross the trench, he will do so in one area.

The Landowners are also warned not to operate farm equipment over the trench or along the length of the trench for 1 year after construction in order to protect the tile.

Future replacements shall conform to these specifications.

20. Outlet Works

The outlet works for the drain shall consist of 6m of HDPE smooth wall pipe as shown on the profile (320 kPa) with a manufactured rodent rotating grate. It shall be installed at the outlet to the open channel.

Erosion protection made up of rip rap and filter fabric shall be installed on the channel side slope from the bottom of the channel to the top of the bank and for a distance of 1m on either side of the outlet. Rip rap shall be made up of 150mm to 300mm quarry stone or approved equal. The area to receive the rip rap shall first be graded to allow the placement of the rip rap to a depth of 400mm below finished grade. After grading, a

layer of filter fabric (Mirafi P150 or approved equal) is to be placed with any joints overlapped a minimum of 600mm. Rip rap shall then be placed with the smaller pieces placed in the gaps and voids to give it a uniform appearance.

The rip rap at the outlet of Branch “D” may extend along the side slopes and bottom of the channel to the downstream end of Culvert No. 5 at the discretion of the Engineer or Drainage Superintendent.

21. Installation of Tile Drain Road Crossing

Where High Density Polyethylene Pipe is specified, the Contractor shall supply, install, and backfill the HPDE smooth wall gasketed pipe with bell and spigot joints (320 KPa) or approved equivalent under road crossings. Future crossings shall be to the same specifications.

Where corrugated steel pipe (CSP) is specified, the Contractor shall supply, install, and backfill aluminized CSP with a minimum wall thickness of 2.8mm in all cases. All corrugation profiles shall be of helical lockseam manufacture using 68 x 13mm corrugations for 1600mm dia. pipe and smaller and 125 x 25mm corrugations for 1800mm dia. pipe and larger. Pipe with 125 x 25mm corrugations shall be used if 68 x 13mm corrugations are not available. Future culvert replacements shall be to the same specifications.

The bottom of the excavation shall be excavated to the required depth with any over excavation backfilled with ¾” clear stone material. When the tile has been installed to the proper grade and depth, the excavation shall be backfilled with ¾” clear stone from the bottom of the excavation to the spring line of the tile. Care shall be taken to ensure that the backfill on either side of the pipe does not differ by more than 300mm so that the pipe is not displaced. Within the road allowance the tile shall be backfilled above the spring line to 200mm below finished grade with OPS Granular “A”. Outside the road allowance excavated material can be used. The top 200mm shall be OPS Granular “M”, produced from 100% crushed dolomite, and shall be mechanically compacted to 100% modified standard proctor density. Filter fabric shall be placed between the changes in bedding and backfill in all cases.

It is the Contractors responsibility to locate and expose any utilities prior to the installation of any tile. If there is a conflict with the tile elevation the Contractor is required to notify the Engineer. Any permits that are required by the Road Authority are the responsibility of the Contractor.

The ditch shall be graded to ensure the surface water is collected to the catch basins and culverts on all road crossings.

The Contractor shall be responsible for maintenance of the crossings for a period of one year after their installation. This will include repairing any settlement areas on the travel surface with granular “M”.

22. Catch Basins

Structure	Station	Type (mm)	Inlet Elev. (m)	Outlet Pipe Elev. (m)	Inlet Pipe Elev. (m)
CB #2	0+290	900x1200	207.30	205.48 (W) 600	205.49 (E) 600
CB #3	0+405	900x1200	207.80	206.06 (W) 600	206.08 (E) 600
CB #4	0+683	900x1200	208.90	207.09 (W) 600	207.13 (E) 600
CB #5	1+148	900x1200	210.70	208.83 (W) 600	208.91 (E) 525
CB #6	1+986	900x1200	213.78	211.67 (W) 525	211.72 (E) 450
CB #7	2+001	900x1200	213.82	211.76 (W) 450	212.37 (E) 350
CB #8 (FUTURE)	OFFSET 2+211	600x600	214.70	214.00 (N) 250	
CB #9	2+621	900x1200	217.35	216.08 (W) 350	216.15 (E) 250 k/o

Catch Basin #8 is for future replacement. It is intended to utilize the existing catch basin.

The catch basins shall be square precast concrete structures as noted above and shall have a birdcage type grate. The ditch inlet catch basins (denoted DICB) shall have a 2:1 sloped top. The direction in the inlet elevation column denotes the direction the low side of the ditch inlet catch basins shall face. The catch basins shall be located with the backside at the property line and at the locations identified on the Plans. The catch basin elevations shall be 50mm above grade. When specified the catch basins shall have a berm constructed on the downstream end. The top of the berm shall be 0.60m above the inlet elevation. The berm shall have a 2:1 front slope and 5:1 back slope with a 1m wide top. The height and back slopes can be increased under the direction of the Drainage Superintendent in order to reduce erosion and facilitate farming. Care shall be taken to

ensure this does not negatively impact upstream lands. The berms shall be constructed using excess materials on site. If more material is required it shall be supplied at the expense of the drainage works.

The catch basins shall be made with the top sections separate from the base sections in order to allow riser sections to be installed or removed as necessary (i.e. the base section shall not extend for more than 150mm above the top of the highest opening in the base section). The wall thickness of all structures shall be 115mm and each shall have a 300mm sump. Birdcage grates shall be manufactured with a bar spacing no larger than 50mm.

The catch basins shall be set at the final elevations as directed by the Drainage Superintendent. The catch basins shall be set on a layer of clear stone. The clear stone shall be extended up to the spring line of the inlet and outlet pipe connections.

The tile at the connection to the catch basins shall be concreted on both the inside and outside prior to backfilling. Any pipe or tile shall not protrude more than 50mm inside the wall.

As part of this item the Contractor shall grade the area in the vicinity of the basin to ensure proper drainage. Rip rap shall be installed around the basins as determined by the Drainage Superintendent or Engineer. The rip rap shall be 150mmx300mm c/w filter fabric. The area to receive the rip rap shall first be graded to allow the placement of the rip rap to a depth of 400mm below finished grade. After grading, a layer of filter fabric (Mirafi P150 or approved equal) is to be placed with any joints overlapped a minimum of 600mm. Rip rap shall then be placed with the smaller pieces placed in the gaps and voids to give it a uniform appearance

The Drainage Superintendent or Engineer may change a birdcage type grate on a catch basin to a concrete lid or sloped birdcage grate at the request of a Landowner.

23. Junction Boxes

The junction boxes shall be installed to the elevations and in the locations shown on the drawings as follows:

Structure	Station	Type (mm)	Top Elev. (m)	Outlet Pipe Elev. (m)	Inlet Pipe Elev. (m)
JB #1	0+157	900x1200	205.50	204.80 (N) 600	204.82 (E) / 204.90 (S) 600 / 200

The junction boxes shall be square precast concrete structures as noted above.

The junction boxes shall be made with the top sections separate from the base sections in order to allow riser sections to be installed or removed as necessary (i.e. the base section shall not extend for more than 150mm above the top of the highest opening in the base section). The wall thickness of all structures shall be 115mm and each shall have a 300mm sump. The top of junction boxes shall be set a minimum of 600mm below grade to accommodate farm tillage practices.

The junction boxes shall be set on a layer of clear stone. The clear stone shall be extended up to the top of the inlet and outlet pipe connections

The tile at the connection to the junction boxes shall be concreted on both the inside and outside prior to backfilling. Any pipe or tile shall not protrude more than 50mm inside the wall.

The Drainage Superintendent may change a concrete lid on a junction box to a birdcage type grate creating a catch basin at the request of a Landowner.

24. Seeding/Restoration

All grass areas disturbed by construction, shall be restored with 100mm of screened topsoil and hydro seeded. The timing of the seeding shall be approved by the Drainage Superintendent or Engineer.

All disturbed side slopes of the channel shall be restored with straw matting and seed.

Seed mixture, fertilizer and application rates are as follows:

- Canada Wild Rye (Elymus Canadensis), Virginia Wild Rye (Elymus virginicus), or Indian grass (Sorghastrum nutans)
- Fertilizer (300 kg/ha.) consisting of 8-32-16.
- Hydraulic mulch (2,999 kg/ha.) type “B” and water (52,700 litres/ha.) in accordance with OPSS 572 (hydroseed).

The above seed mixture shall apply unless otherwise approved by the Drainage Superintendent or Engineer.

25. Subsurface Drainage

All existing subsurface drains encountered during construction shall be reconnected to the open channel and tile drain unless otherwise noted on the drawings or as directed by the Drainage Superintendent.

A suitable length of equivalent sized PE agricultural tubing shall be used to connect the drain to the open channel and tile drain. Manufactured fittings shall connect the PE tile to the existing drain and to the concrete tile. The connections shall be carefully backfilled to

ensure there is adequate support under the pipe and large clumps of clay do not displace the tile.

26. Environmental Considerations

The Contractor shall take care to adhere to the following considerations.

- Operate machinery in a manner that minimizes disturbance to the banks of the watercourse.
- Erosion and sediment control measures must be installed prior to construction to prevent sediment from entering the water body.
- Material shall not be in areas regulated by the Conservation Authority or Ministry of Natural Resources.
- All granular and erosion control materials shall be stockpiled a minimum of 3.0m from the top of the bank or excavation. Material shall not be placed in surface water runs or open inlets that enter the channel.
- All activities, including maintenance procedures, shall be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicle and equipment refuelling and maintenance shall be conducted away from the channel, any surface water runs, or open inlets. All waste materials shall be stockpiled well back from the top of the bank and all surface water runs and open inlets that enter the drain.
- When possible, all construction within the open channel shall be carried out during periods of low flow or in dry conditions.
- The Contractor shall conduct regular inspections and maintain erosion and sediment control measures and structures during the course of construction.
- The Contractor shall repair erosion and sediment control measures and structures if damage occurs.
- The Contractor shall remove non-biodegradable erosion and sediment control materials once site is stabilized.
- Remove all construction materials from site upon project completion.

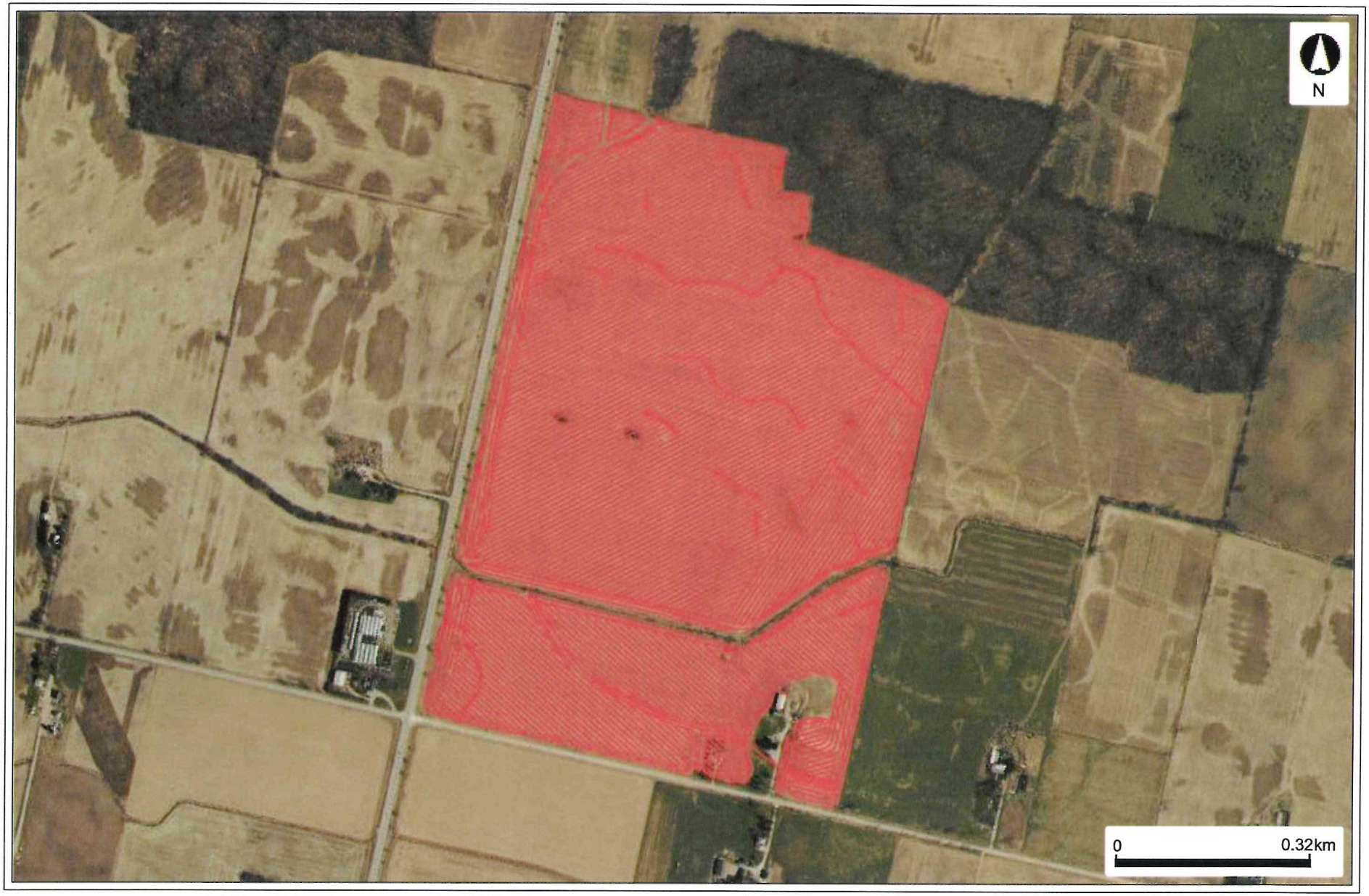
A light duty silt fencing shall be installed down-gradient of the work for the duration of construction.

The light duty silt fencing shall be supplied and installed in accordance with OPSS 577 and OPSD 219.110. The light duty silt fencing shall be removed once construction is complete.

TILE MAPS


Timber
NewFen
Ditch
Sewer
HomeSt
Road

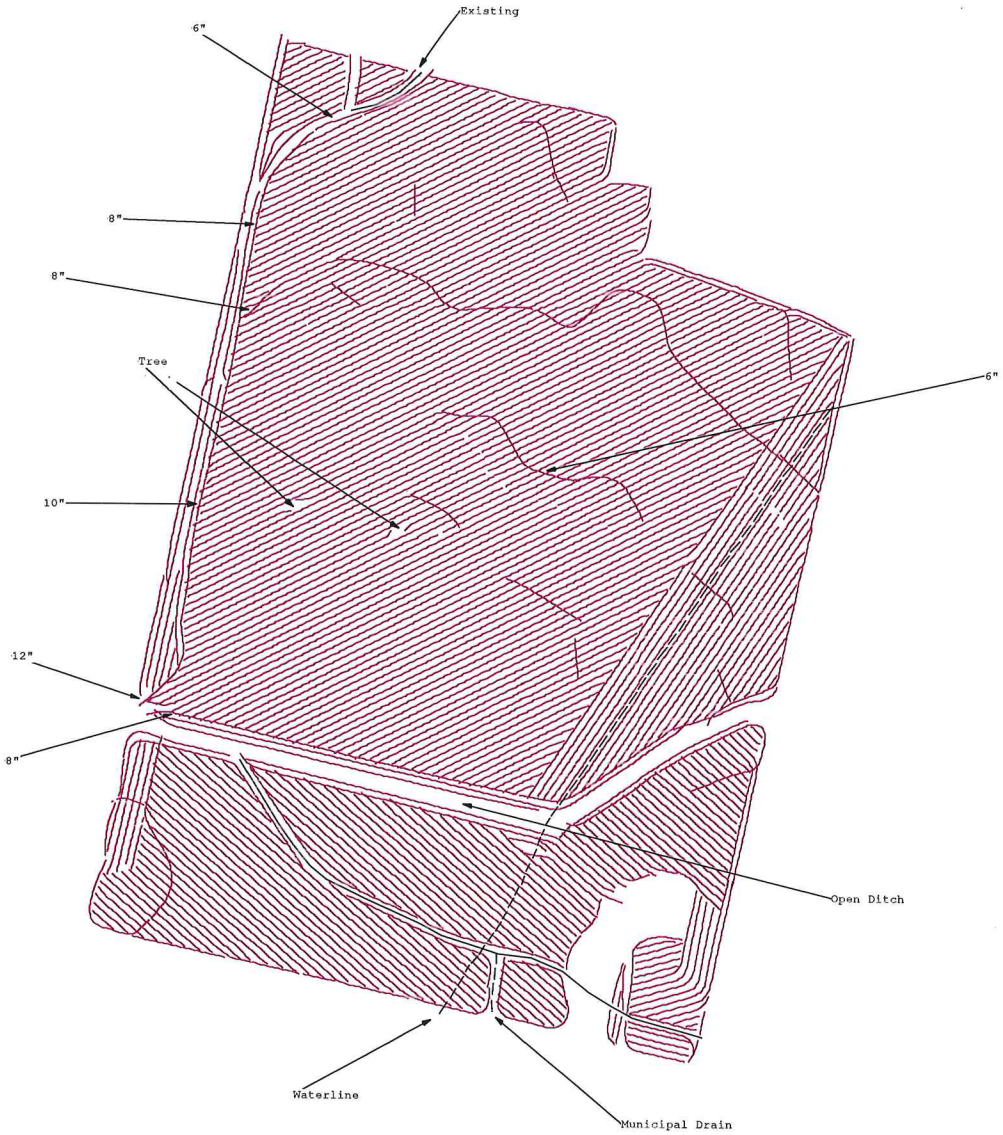
Kustermans Farms



Map Created: 6/26/2020
Map Center: 43.19334 N, -81.67064 W

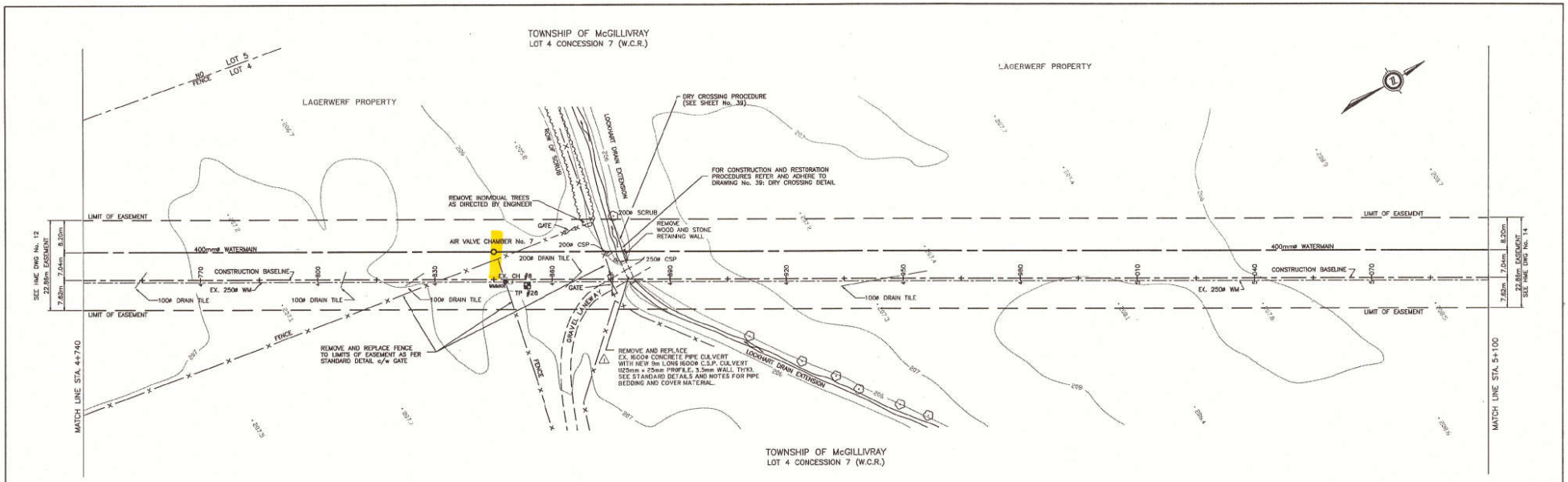
LATEC GPS: KUSTERMAN_T.shp.gps

North

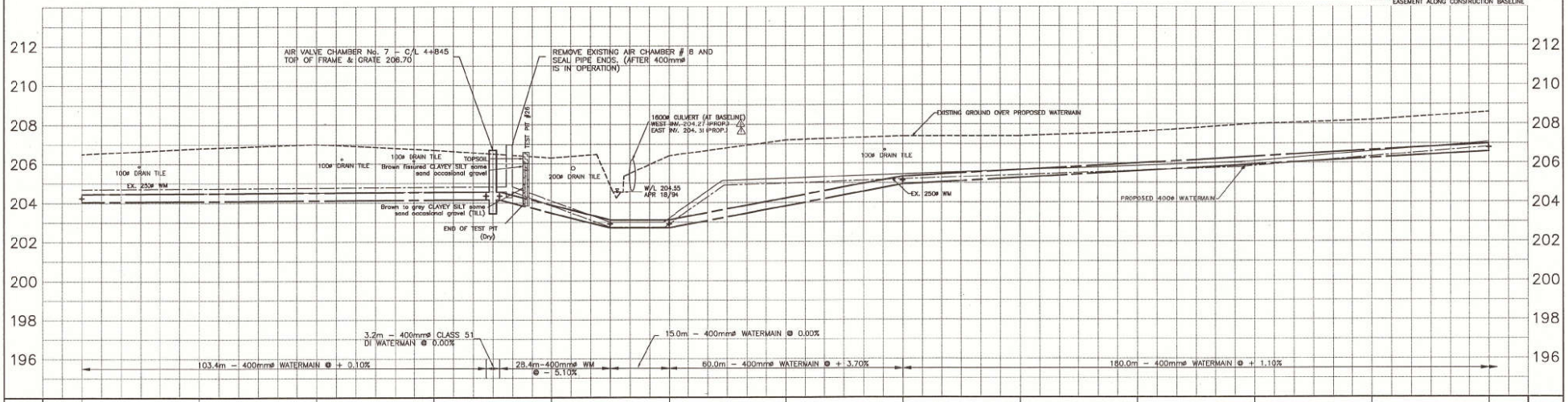


Customer: Kustermans Farms		
Location: W Corner Drive		
Scale: 350 feet	Spacing: 25'	Date: 2020
A.G Hayter Contracting Ltd		

WATERMAIN DRAWING



NOTE: STATIONS REPRESENT LOCATIONS IN THE EASEMENT ALONG CONSTRUCTION BASELINE



BASE LINE STATION	4+740	4+755	4+770	4+785	4+800	4+815	4+830	4+843.4	4+845	4+846.6	4+860	4+875	4+890	4+905	4+920	4+935	4+950	4+965	4+980	4+995	5+010	5+025	5+040	5+055	5+070	5+085	5+100
℄ WATERMAIN ELEV.	204.25							204.35	204.35			202.81	202.81				205.13										206.78
GROUND ELEV.	206.5		206.8		207.0		206.7				206.3		206.4			207.2		207.4		207.4	207.6		208.0		208.2		208.6

No.	REVISION	DATE	BY
1	FOR TENDER	APR / 95	RLT

DESIGNED: DLE
DRAWN: AL/FCV
CHECKED: TER
APPROVED: DWP
DATE: DECEMBER 1994

D. W. PLETCH

Huron-Middlesex Engineering

totten sims hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS
252-759 HYDE PARK ROAD, LONDON, ONTARIO N6H 3S6

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

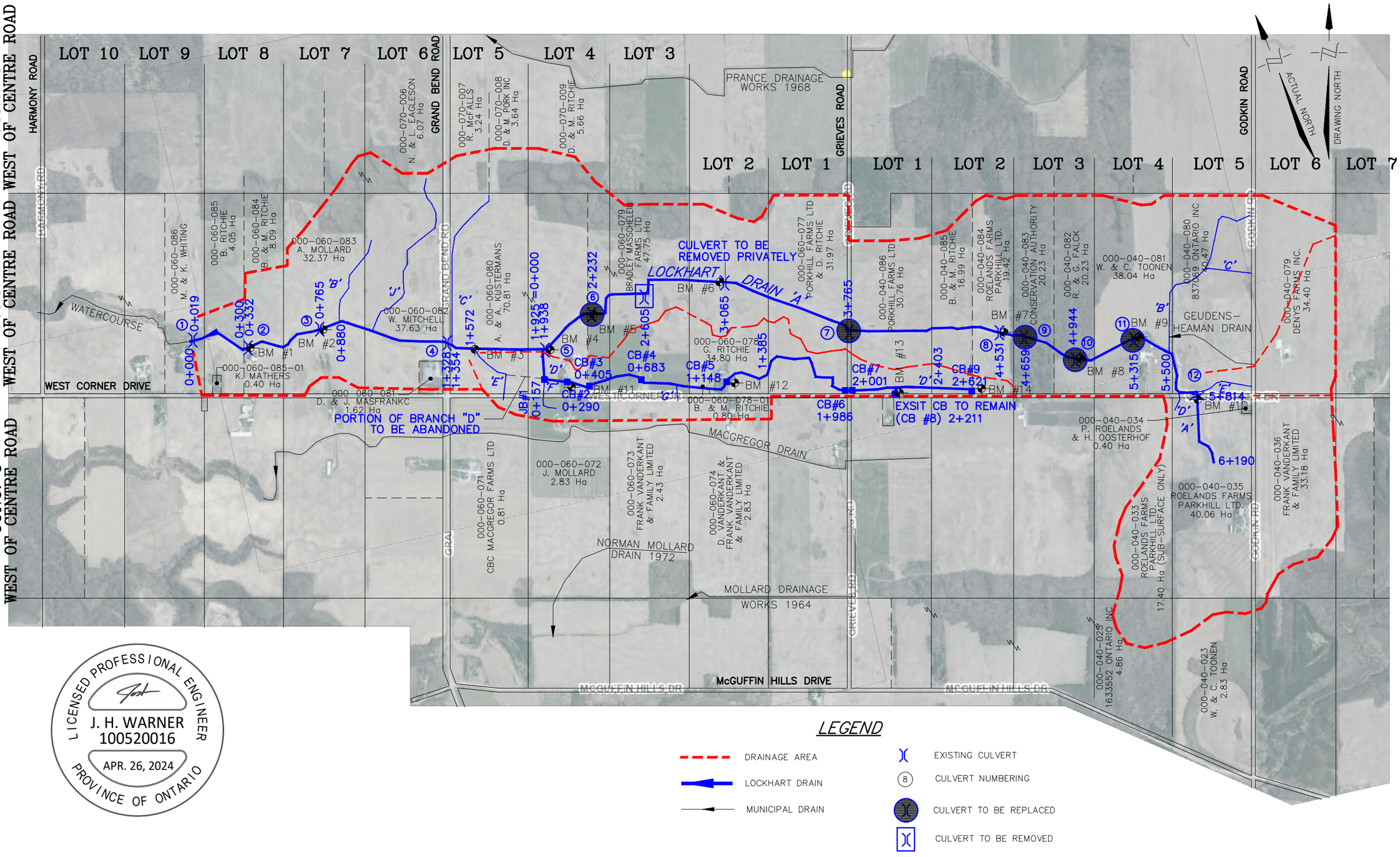
SCALE
(1:500 FULL SCALE) 5.0 0 10.0 HORIZONTAL
(1:100 FULL SCALE) 1.0 0 2.0 VERTICAL

PARKHILL WATER SUPPLY SYSTEM
TRANSMISSION MAIN - MT. CARMEL TO PARKHILL
O.C.W.A. PROJECT No. 5-0005-02

PLAN AND PROFILE
STA. 4+740 TO STA. 5+100

PROJECT No. 038007
SHEET No. 13
PLAN FILE No. 91-26-I P_ROW13

APR 2 1 1995



LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO

Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Plan

PROJECT No. 2022-1463

APPROVED: J. WARNER
CHECKED: B. VAN RUITENBURG
DRAWN: C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APR. 26, 2024	CS

SCALE: 1:20,000
0 200 400 600m

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN
PLAN

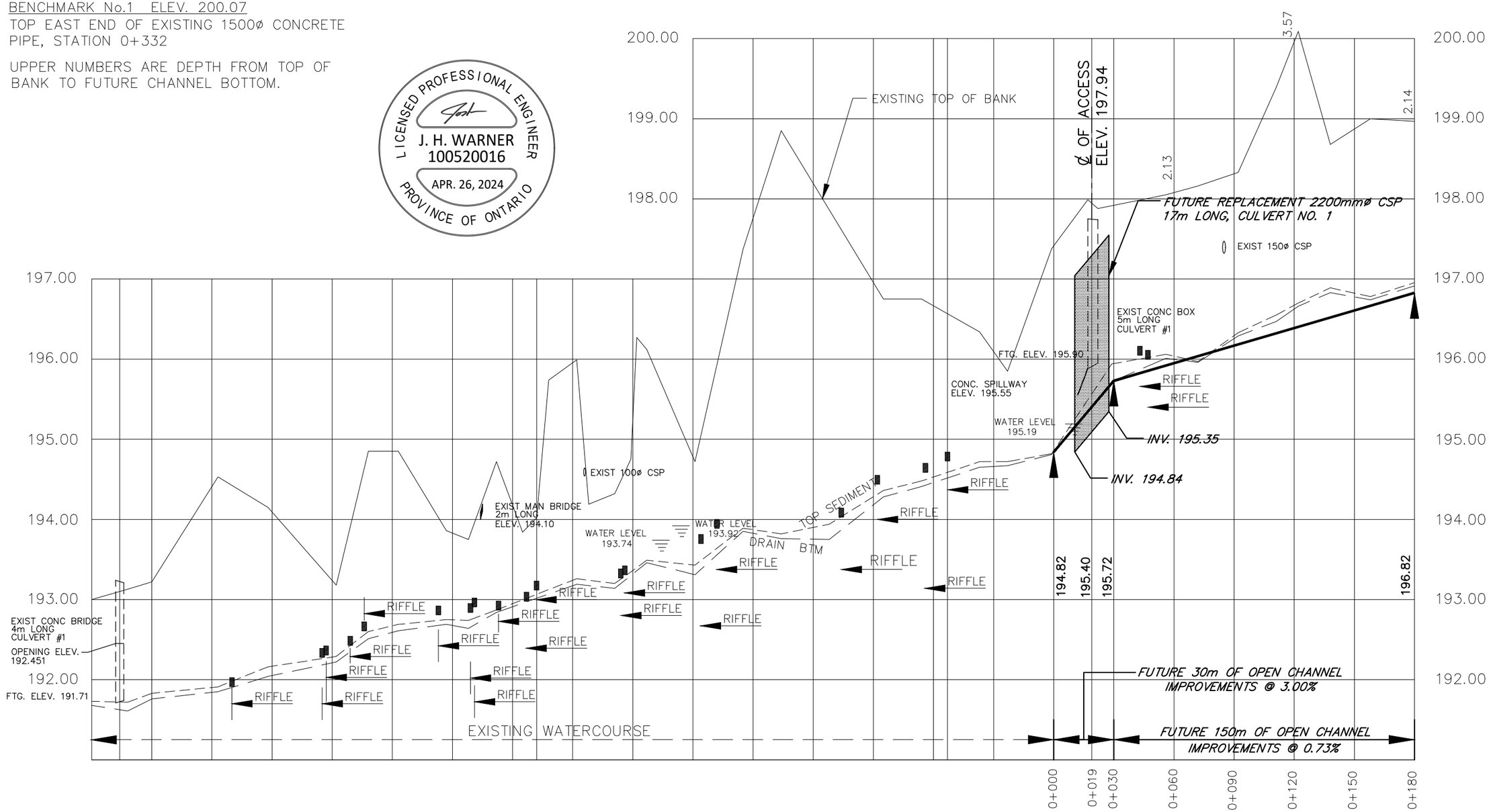
1 OF 18

Last Updated: April 26, 2024

GENERAL NOTES

1. BENCHMARK No.1 ELEV. 200.07
   TOP EAST END OF EXISTING 1500ø CONCRETE PIPE, STATION 0+332
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 1

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

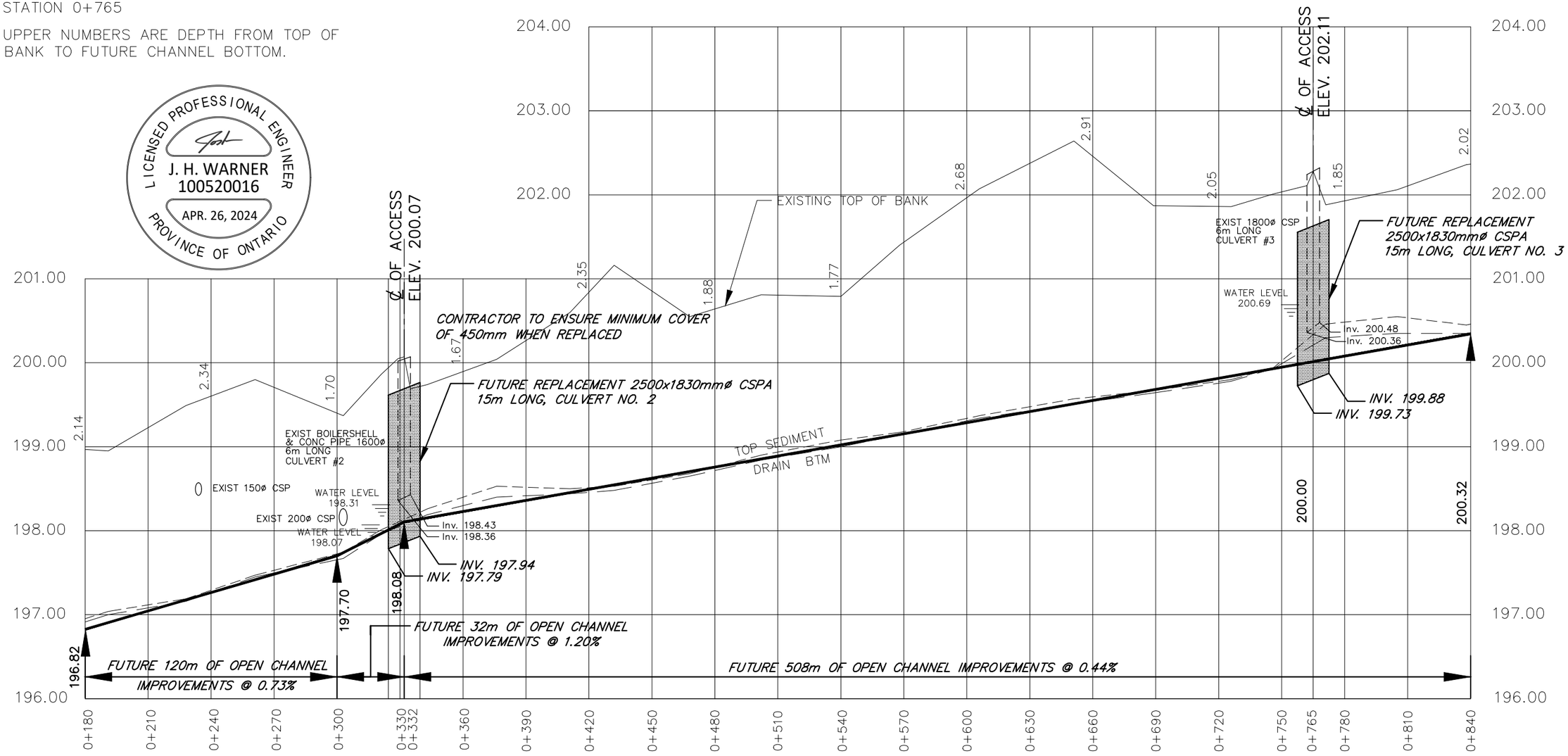
GENERAL NOTES

1. BENCHMARK No.1 ELEV. 200.07
   TOP EAST END OF EXISTING 1500ø CONCRETE PIPE, STATION 0+332

   BENCHMARK No.2 ELEV. 202.32
   TOP EAST END OF EXISTING 1800ø CSP STATION 0+765

2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 2

PROJECT No. 2022-1463

APPROVED J. WARNER

CHECKED B. VAN RUITENBURG

DRAWN C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

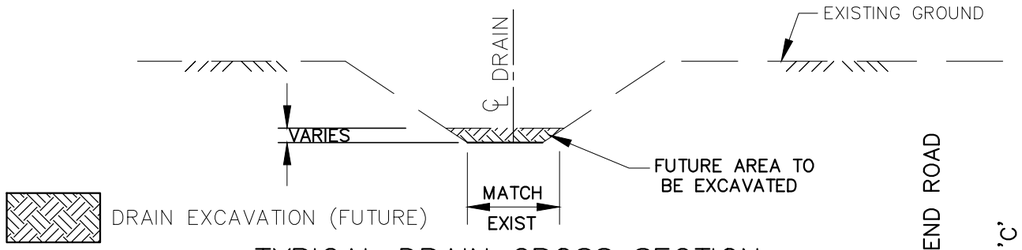
LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

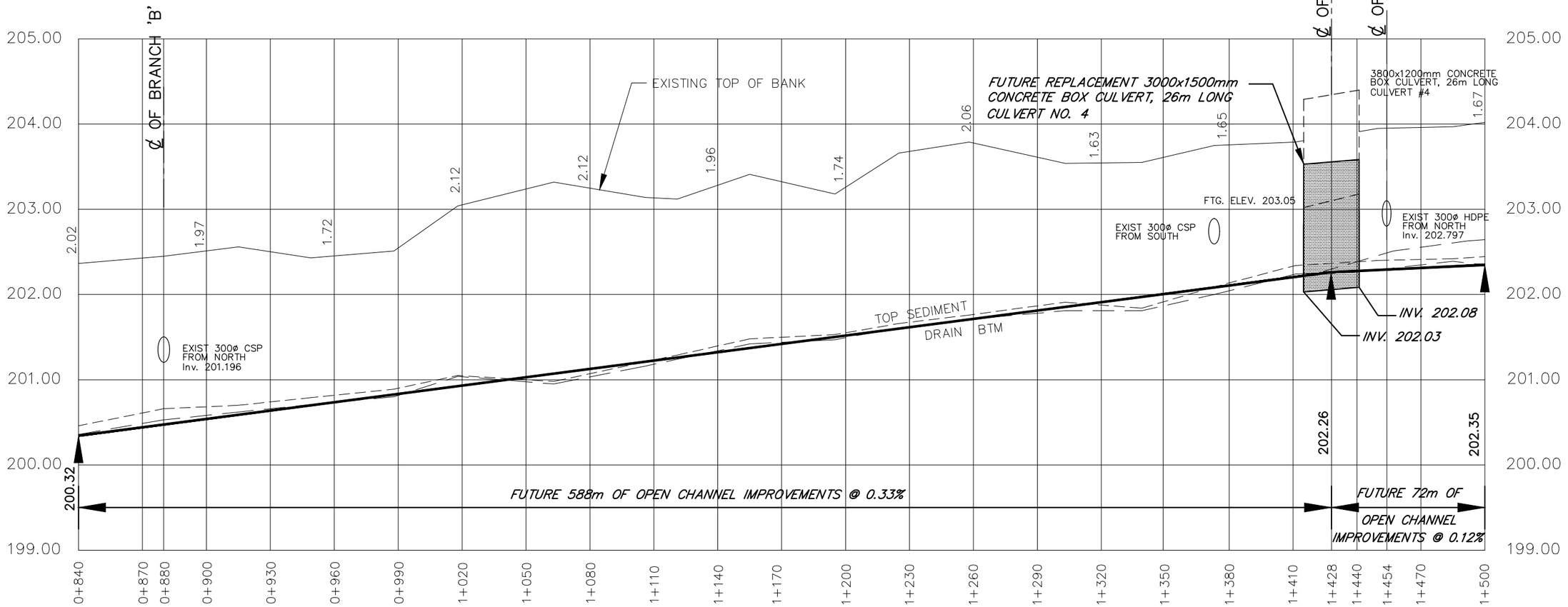
GENERAL NOTES

1. BENCHMARK No.2 ELEV. 202.32
   TOP EAST END OF EXISTING 1800ø CSP
   STATION 0+765
   BENCHMARK No.3 ELEV. 203.24
   TOP NORTH END OF EXISTING 500ø CSP
   STATION 1+572 (AT BRANCH "D")
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



TYPICAL DRAIN CROSS SECTION
NTS



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 3

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

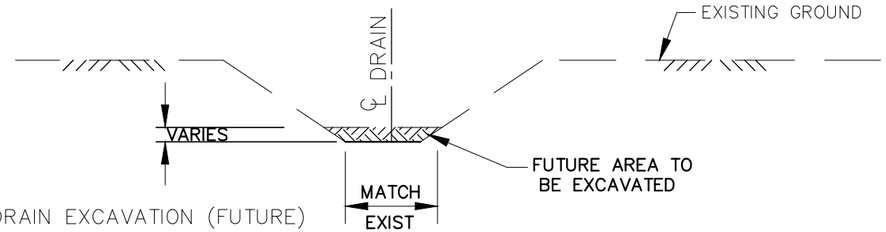
MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

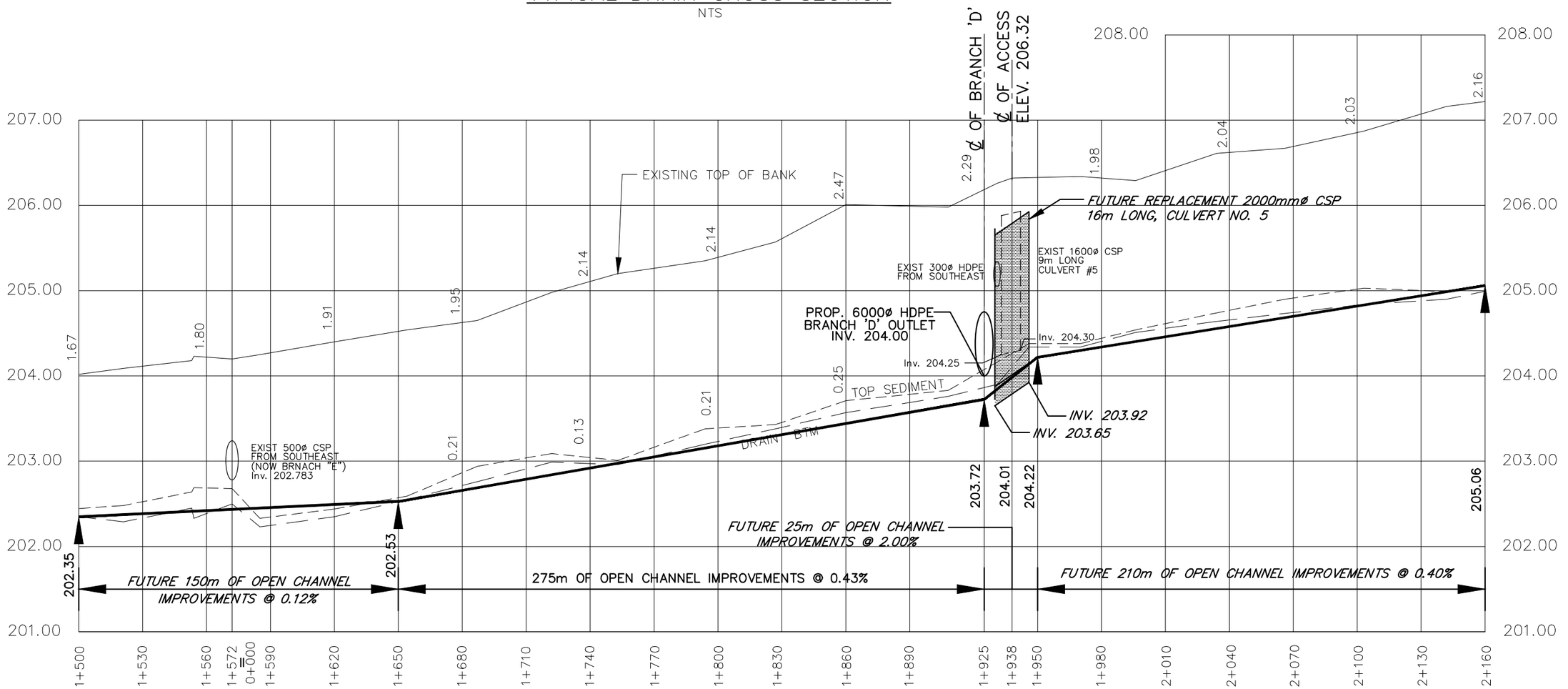
GENERAL NOTES

1. BENCHMARK No.3 ELEV. 203.24
   TOP NORTH END OF EXISTING 500ø CSP
   STATION 1+572 (AT NOW BRANCH "E")
   BENCHMARK No.4 ELEV. 205.93
   TOP EAST END OF EXISTING 1600ø CSP
   STATION 1+938
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



TYPICAL DRAIN CROSS SECTION
NTS

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 4

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

SCALE: 1:2,000
0 20 40 60m

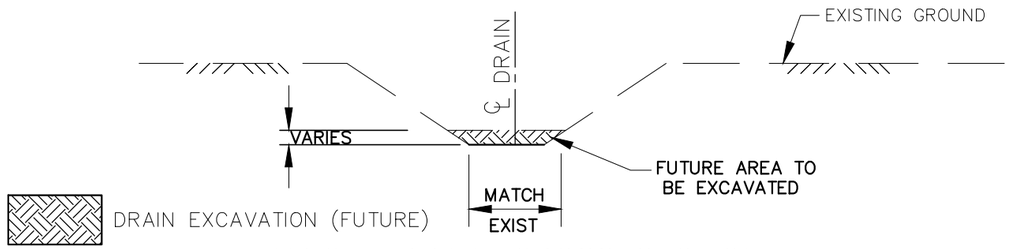
MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "A"
PROFILE

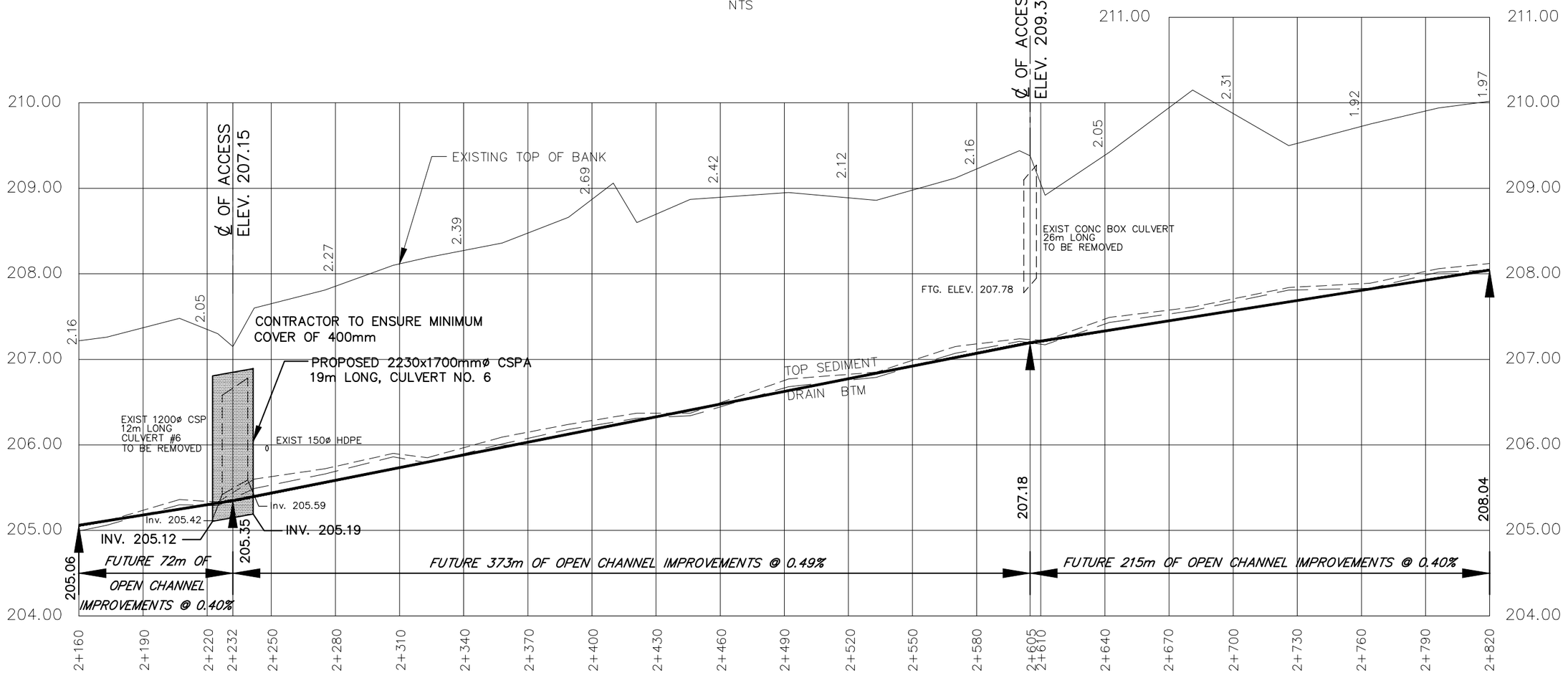
Last Updated: April 26, 2024

GENERAL NOTES

1. BENCHMARK No.5 ELEV. 206.78
   TOP EAST END OF EXISTING 1200ø CSP
   STATION 2+232
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



TYPICAL DRAIN CROSS SECTION
NTS



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 5

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

SCALE: 1:2,000
0 20 40 60m

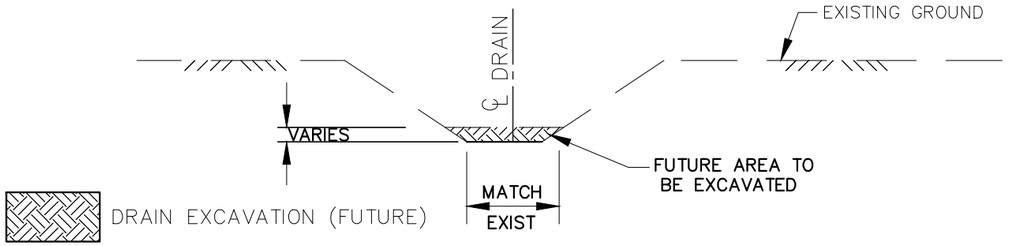
MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

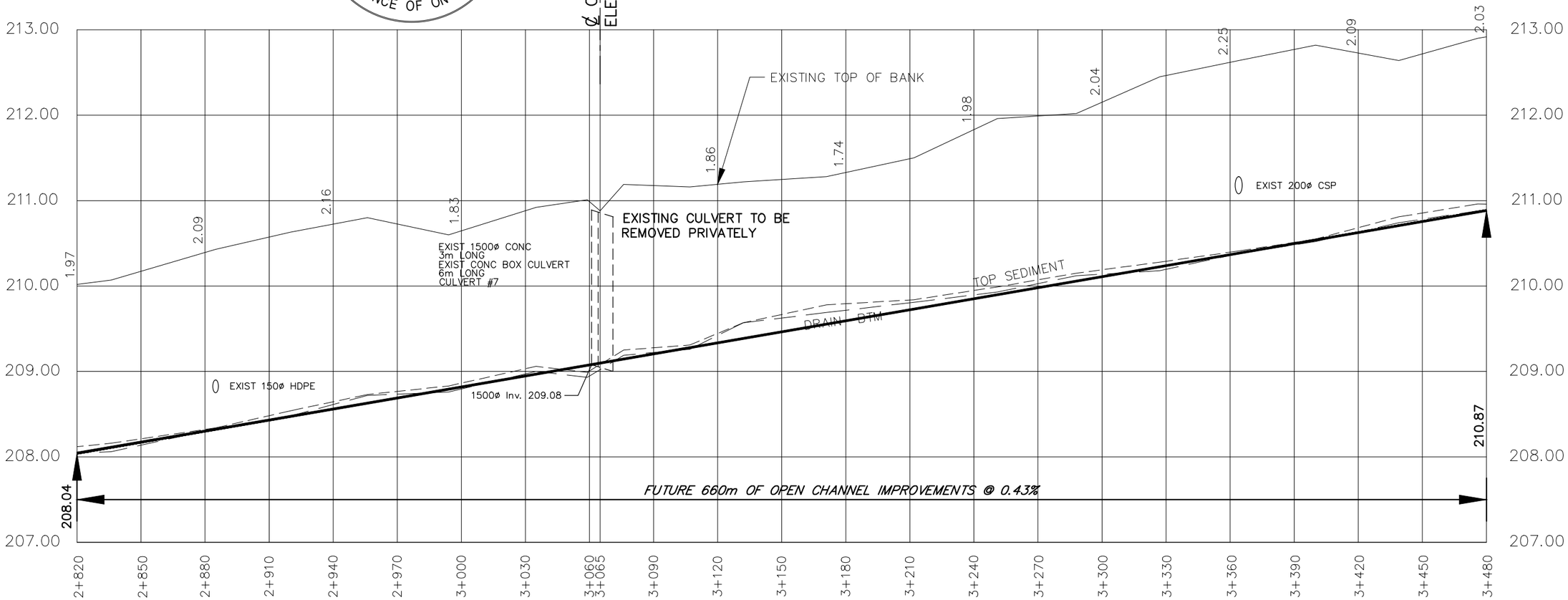
GENERAL NOTES

1. BENCHMARK No.6 ELEV. 209.08
   INVERT WEST END OF EXISTING 1500ø CONCRETE PIPE, STATION 3+065
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



TYPICAL DRAIN CROSS SECTION
NTS

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 6

PROJECT No. 2022–1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX

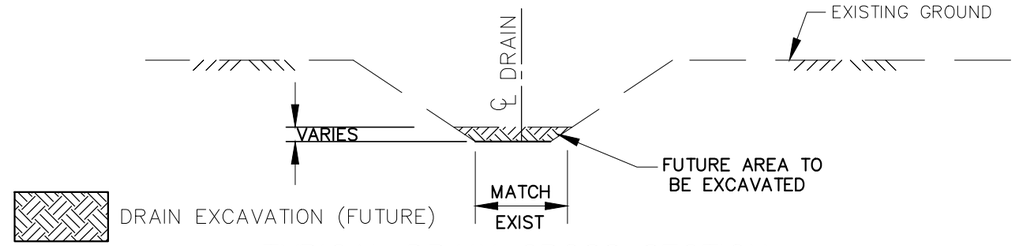
LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

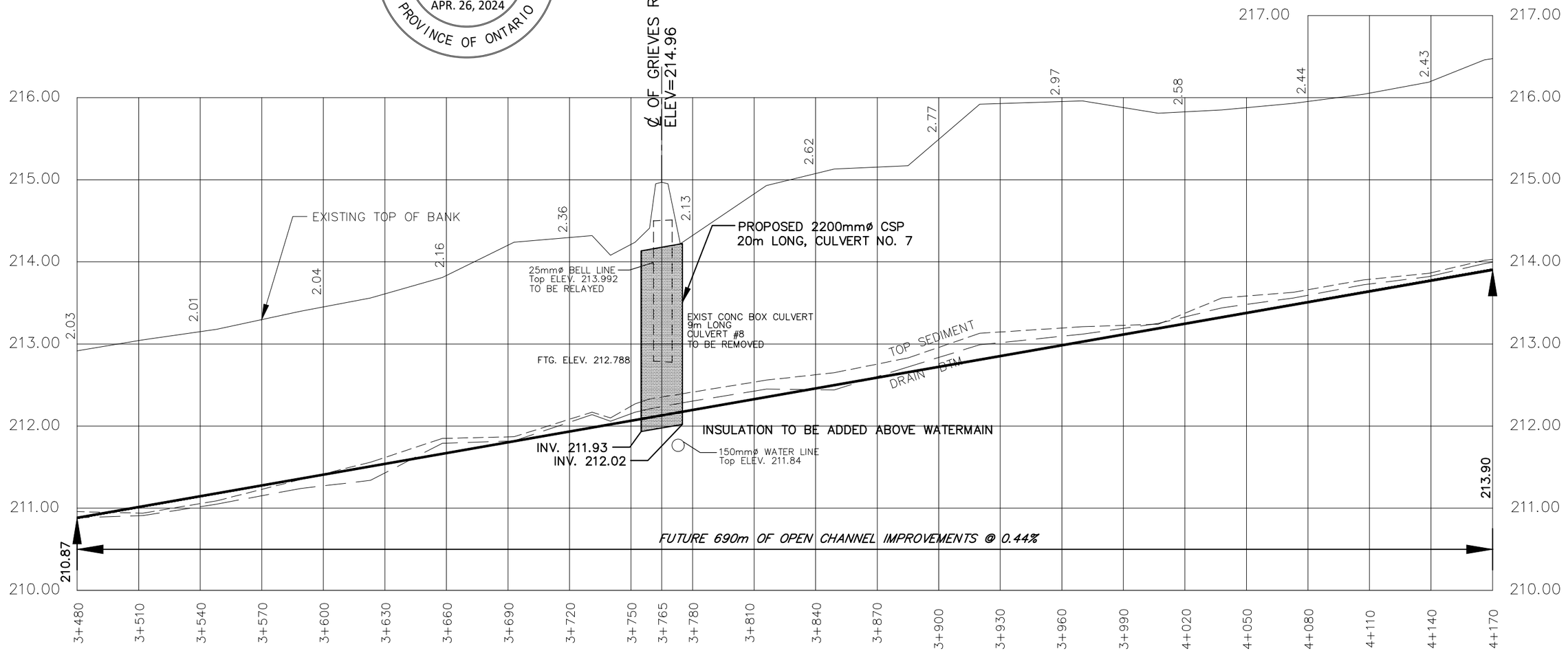
GENERAL NOTES

1. BENCHMARK No.6 ELEV. 209.08
   INVERT WEST END OF EXISTING 1500ø CONCRETE PIPE, STATION 3+065
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



TYPICAL DRAIN CROSS SECTION
NTS



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 7

PROJECT No. 2022–1463

APPROVED	CHECKED	DRAWN
J. WARNER	B. VAN RUITENBURG	C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

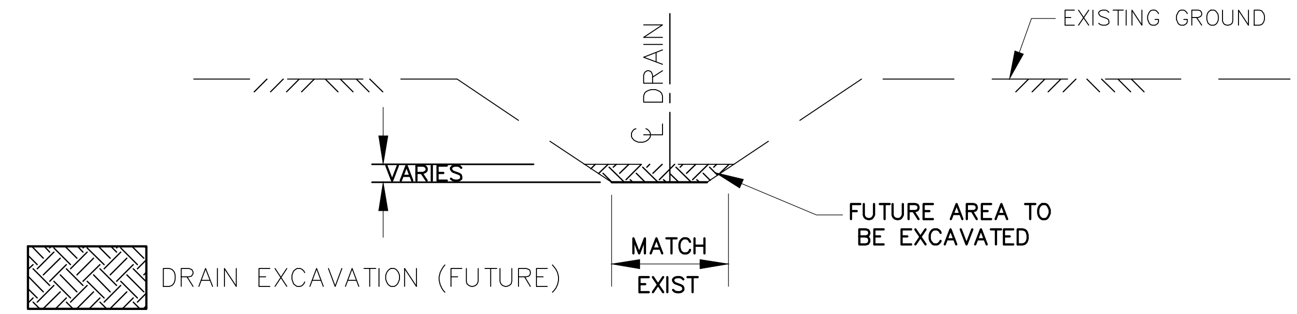
LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

GENERAL NOTES

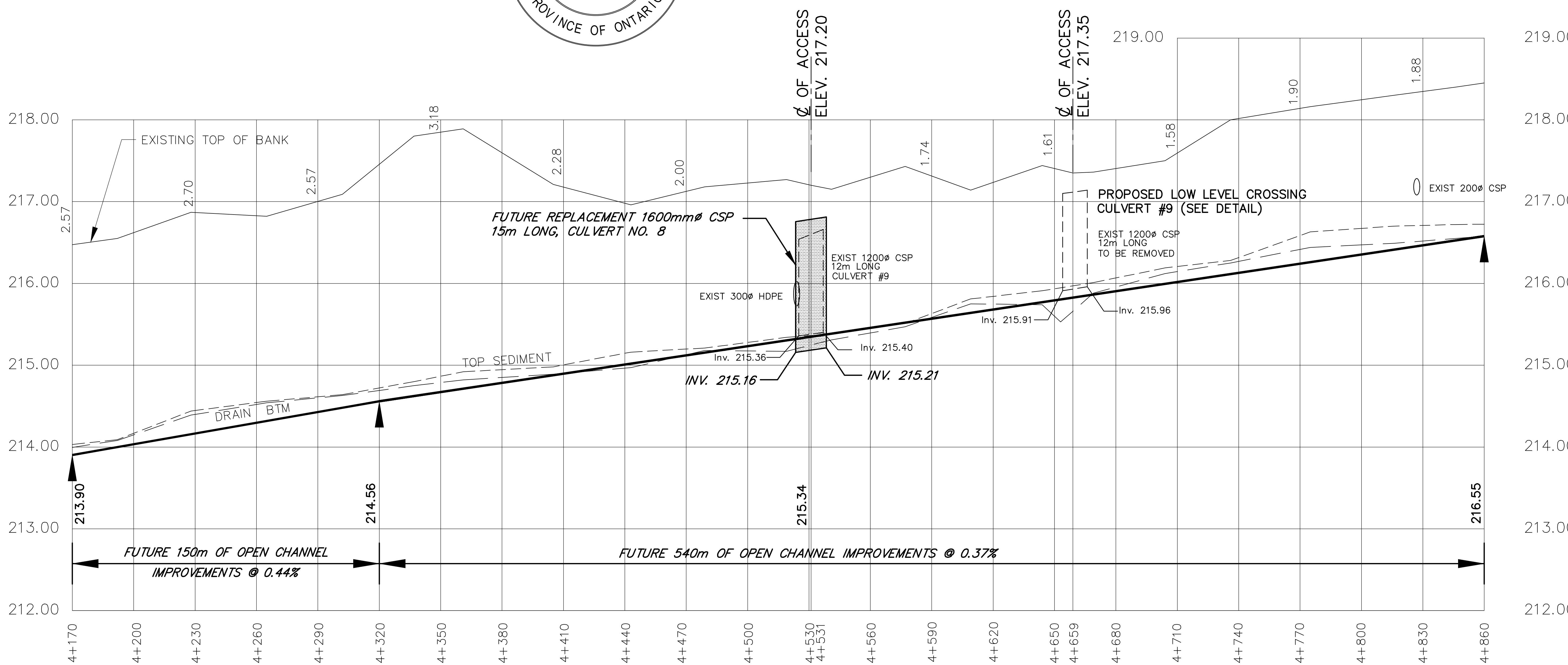
1. BENCHMARK No.7 ELEV. 216.66
   TOP EAST END OF EXISTING 1200ø CSP
   STATION 4+531
2. UPPER NUMBERS ARE DEPTH FROM TOP OF
   BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



TYPICAL DRAIN CROSS SECTION

NTS



R Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 8

PROJECT No. 2022-1463

APPROVED: J. WARNER
CHECKED: B. VAN RUITENBURG
DRAWN: C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

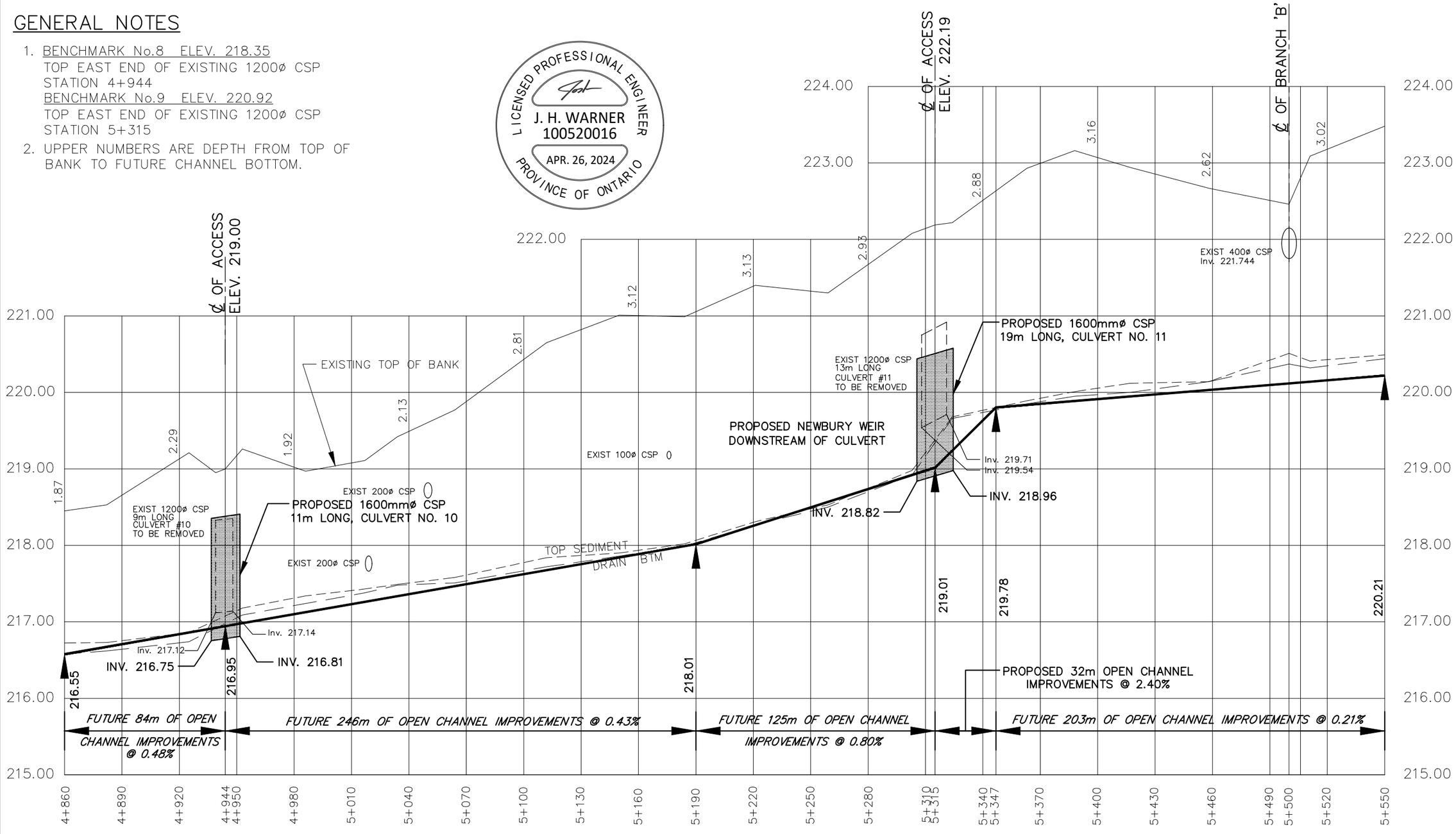
LOCKHART DRAIN "A"

PROFILE

GENERAL NOTES

1. BENCHMARK No.8 ELEV. 218.35
   TOP EAST END OF EXISTING 1200ø CSP
   STATION 4+944
   BENCHMARK No.9 ELEV. 220.92
   TOP EAST END OF EXISTING 1200ø CSP
   STATION 5+315
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 9

PROJECT No. 2022-1463

APPROVED J. WARNER

CHECKED B. VAN RUITENBURG

DRAWN C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

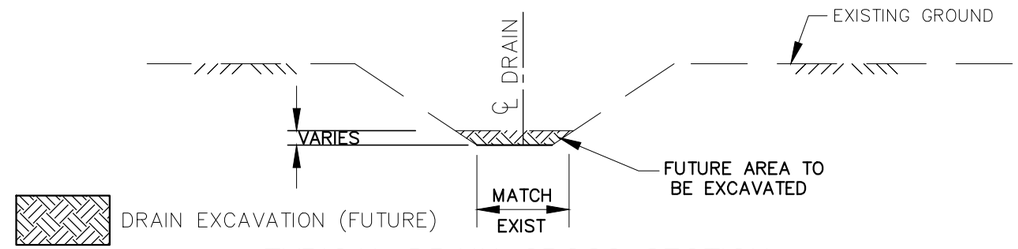
LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

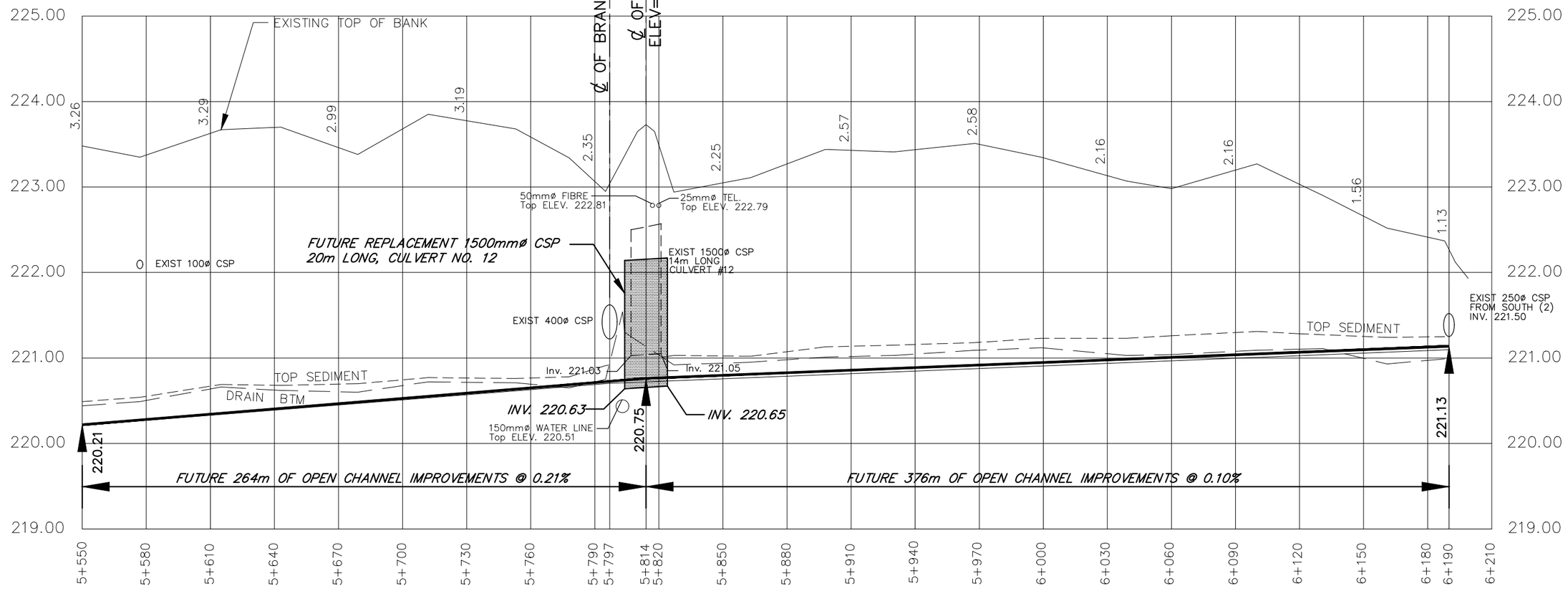
GENERAL NOTES

1. BENCHMARK No.10 ELEV. 222.57
   TOP EAST END OF EXISTING 1500ø CSP
   STATION 5+814
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



TYPICAL DRAIN CROSS SECTION
NTS



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain "A" Profile 10

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

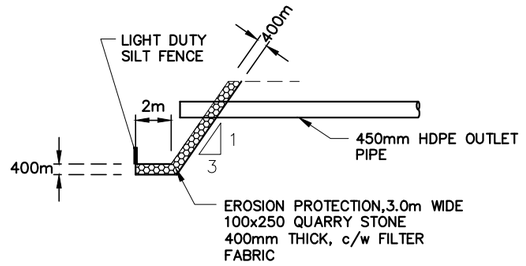
LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

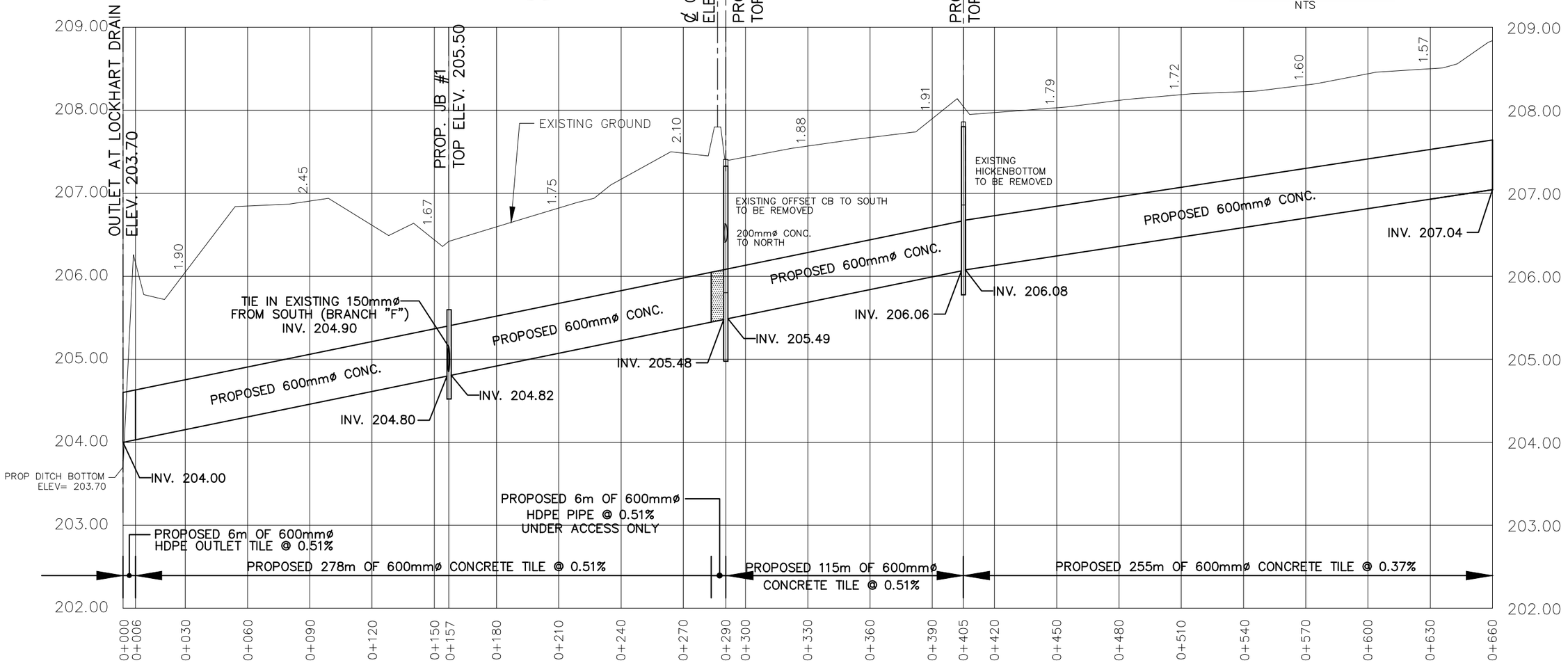
GENERAL NOTES

1. BENCHMARK No.4 ELEV. 205.93
   TOP EAST END OF EXISTING 1600ø CSP
   STATION 1+938 OF DRAIN "A"
   JUST EAST OF BRANCH "D" OUTLET
2. NUMBERS ARE DEPTH FROM GROUND
   TO THE INVERT OF THE PROPOSED TILE.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



OUTLET DETAIL
NTS



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Branch 'D' Profile 1

PROJECT No. 2022-1463

APPROVED	J. WARNER
CHECKED	B. VAN RUITENBURG
DRAWN	C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "D"
PROFILE

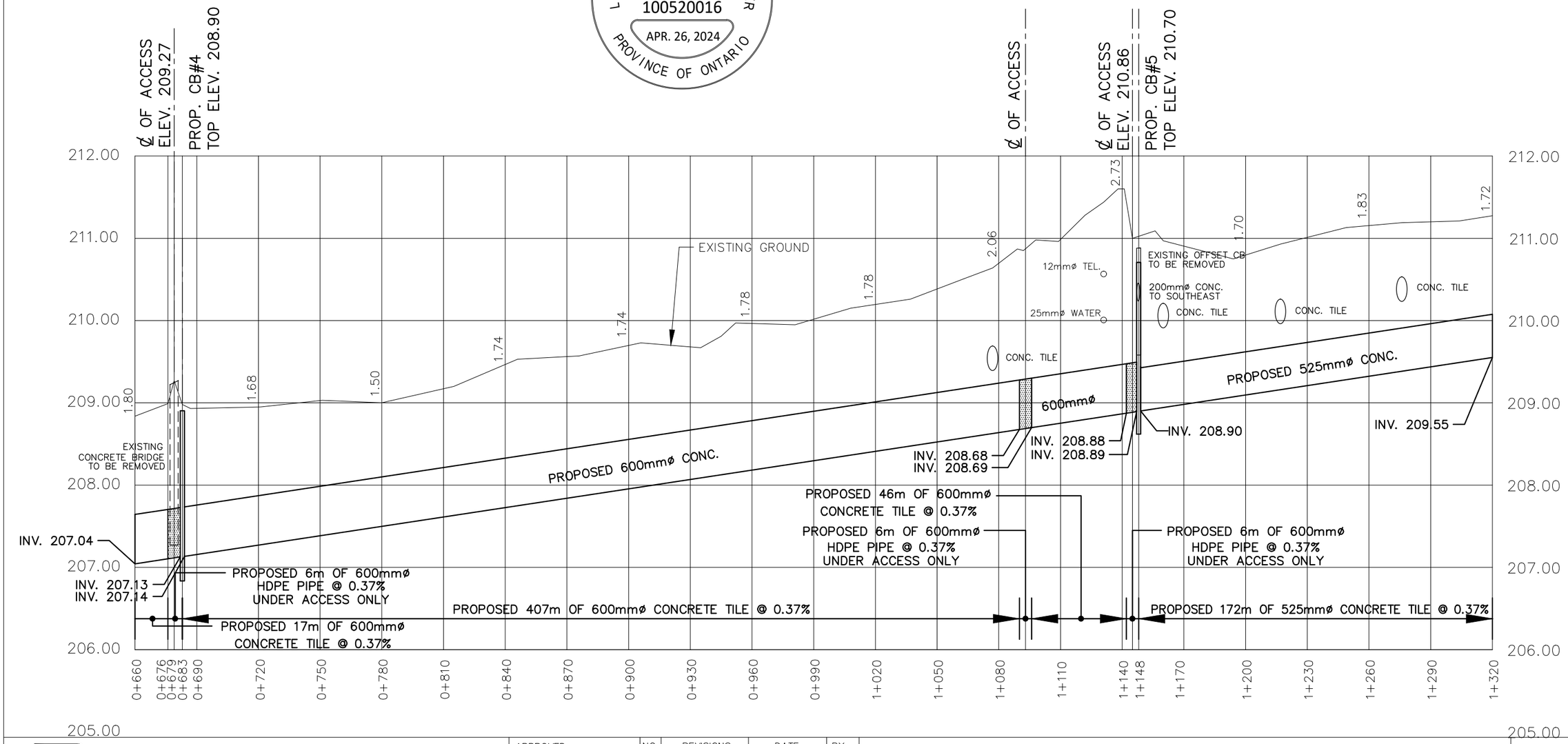
Last Updated: April 26, 2024

GENERAL NOTES

1. BENCHMARK No.11 ELEV. 207.41
   TOP OF EXISTING CB LOCATED 9m SOUTH
   OF EXISTING OFFSET CATCH BASIN AT ST. 0+290

2. NUMBERS ARE DEPTH FROM GROUND
   TO THE INVERT OF THE PROPOSED TILE.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Branch 'D' Profile 2

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "D"
PROFILE

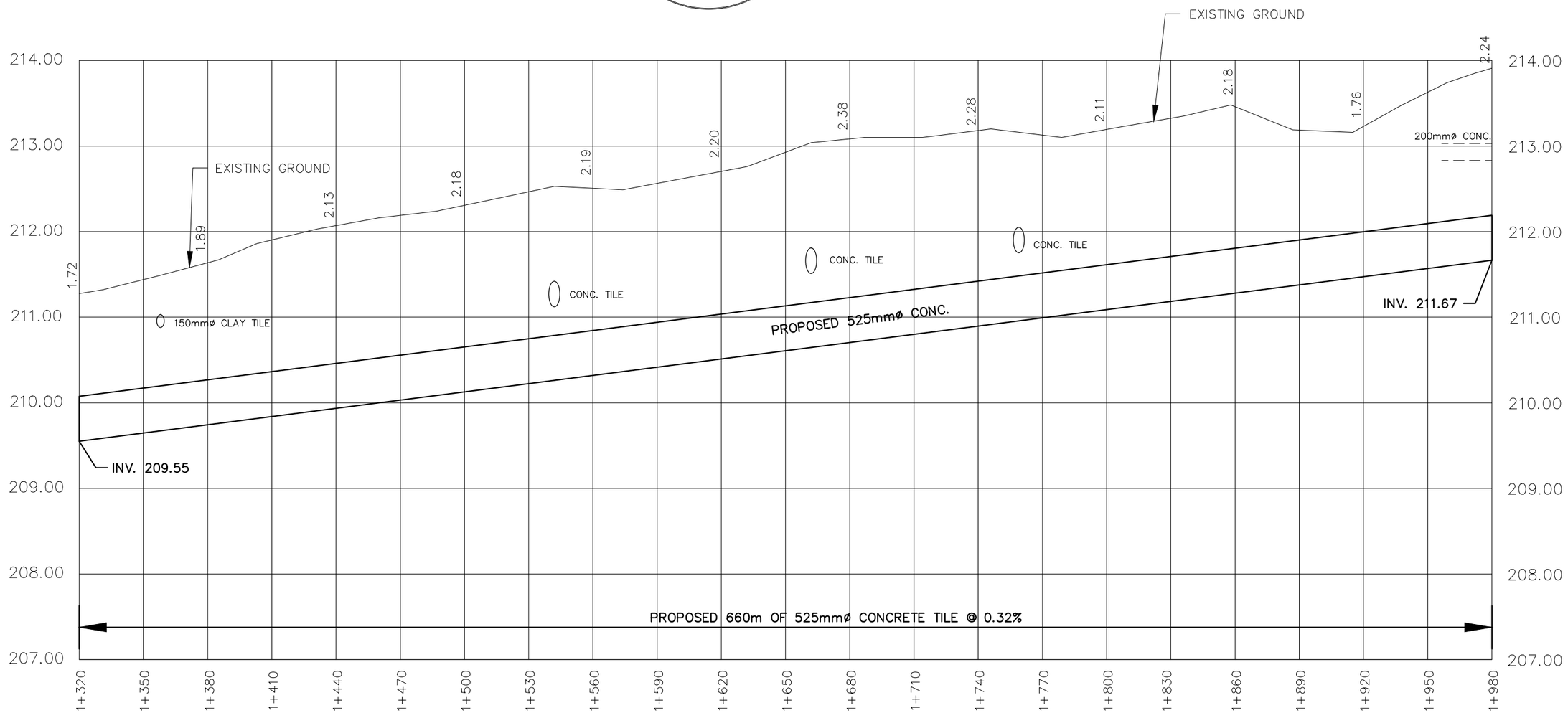
Last Updated: April 26, 2024

GENERAL NOTES

1. BENCHMARK No.12 ELEV. 210.88
   TOP OF EXISTING OFFSET CATCHBASIN
   AT STATION 1+148

2. NUMBERS ARE DEPTH FROM GROUND
   TO THE INVERT OF THE PROPOSED TILE.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Branch 'D' Profile 3

PROJECT No. 2022–1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "D"
PROFILE

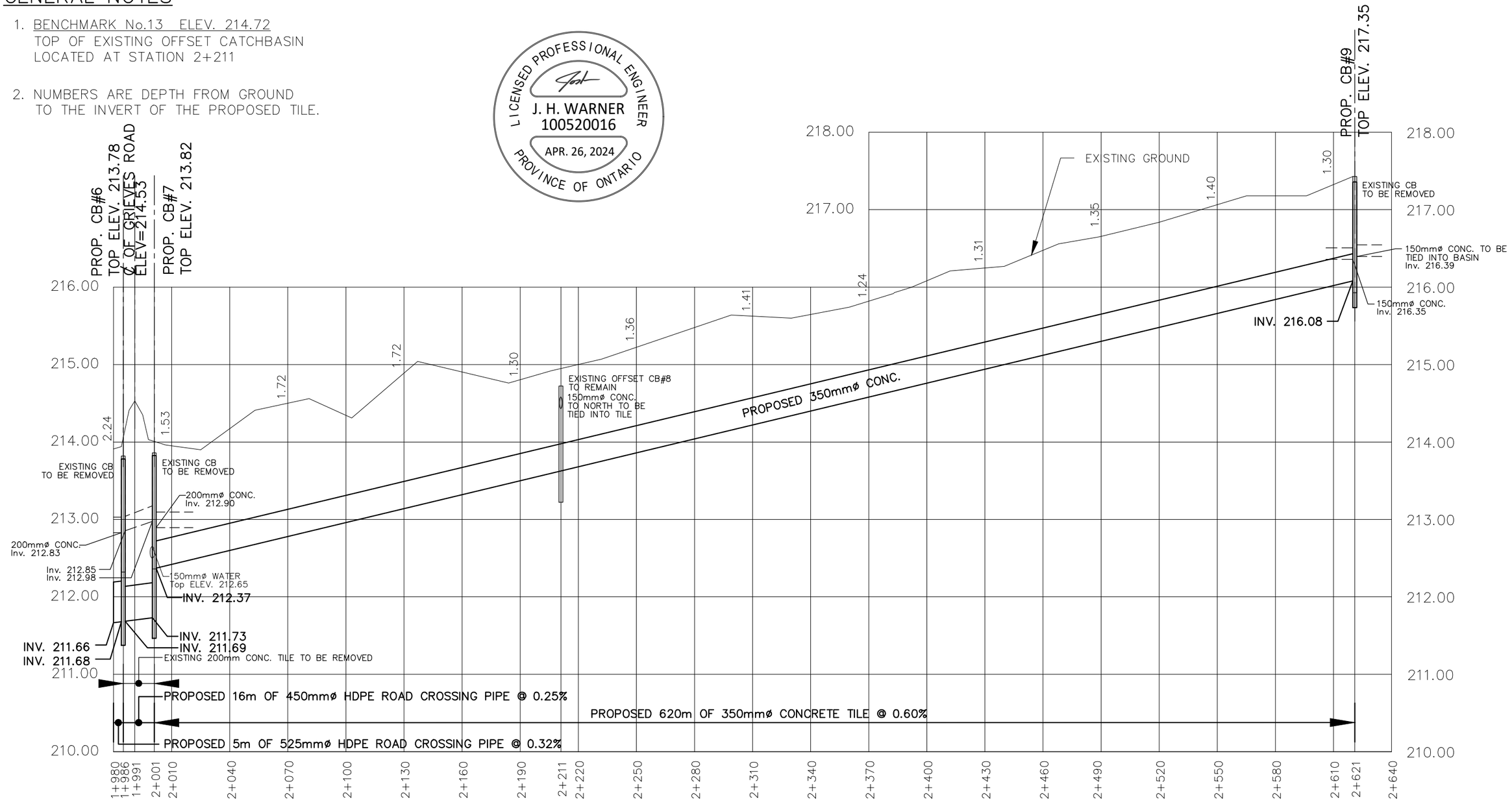
Last Updated: April 26, 2024

GENERAL NOTES

1. BENCHMARK No.13 ELEV. 214.72
   TOP OF EXISTING OFFSET CATCHBASIN
   LOCATED AT STATION 2+211

2. NUMBERS ARE DEPTH FROM GROUND
   TO THE INVERT OF THE PROPOSED TILE.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



Dobbin Engineering Inc.
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Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Branch 'D' Profile 4

PROJECT No. 2022-1463

APPROVED	J. WARNER
CHECKED	B. VAN RUITENBURG
DRAWN	C. SAUNDERS

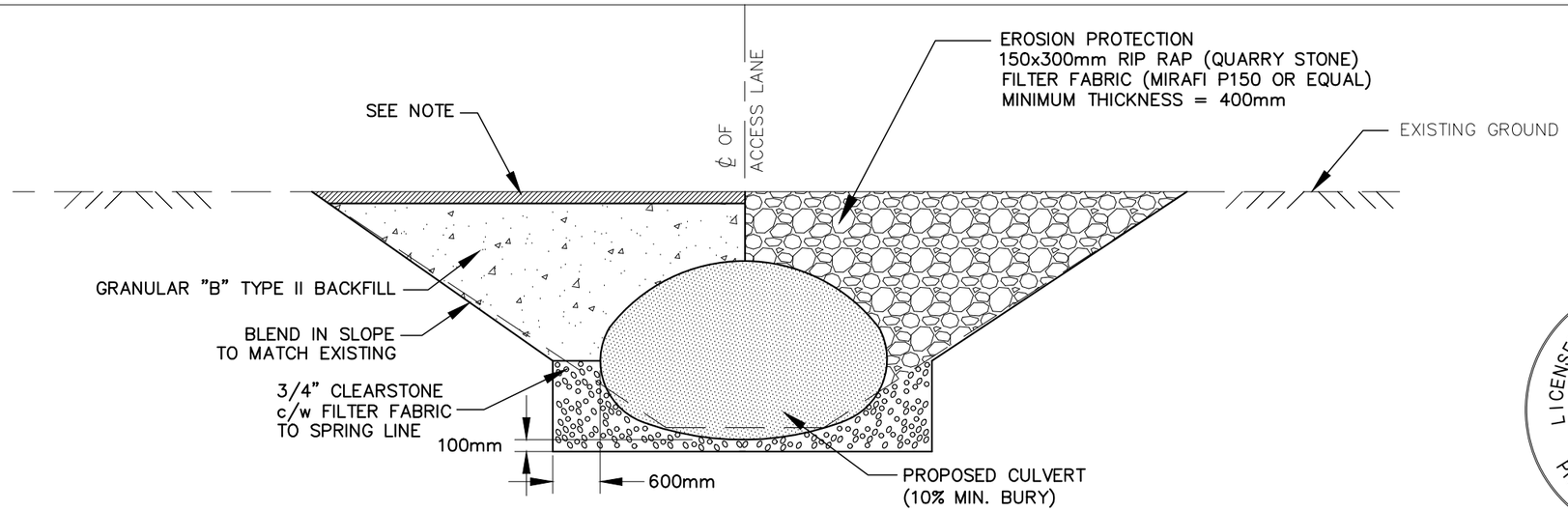
NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

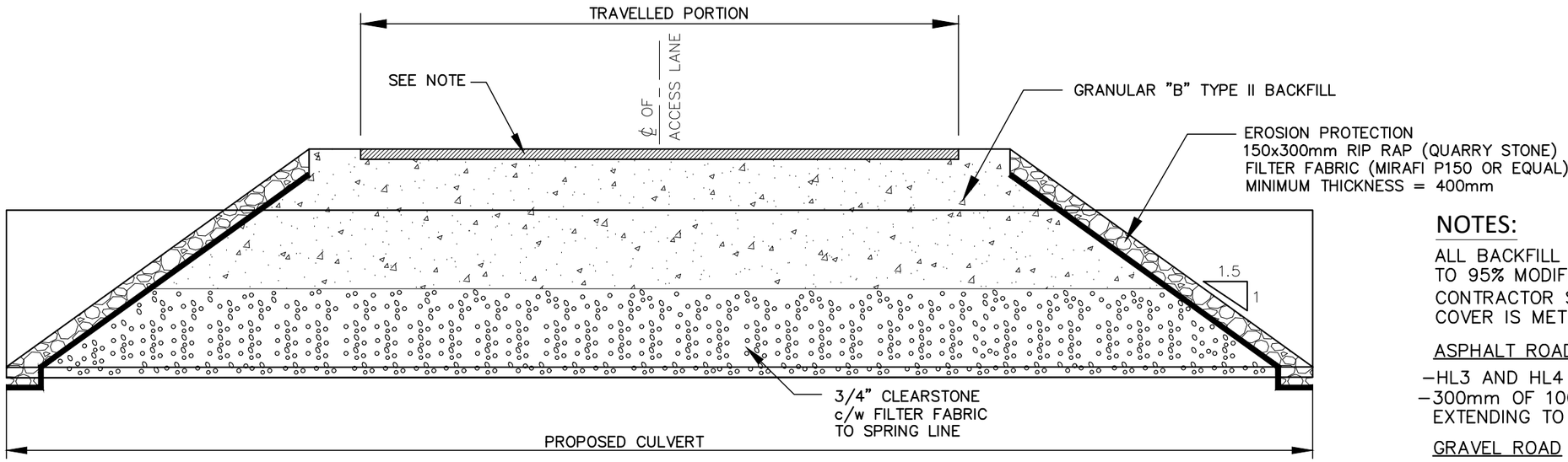
LOCKHART DRAIN "D"
PROFILE

Last Updated: April 26, 2024



PROPOSED PIPE END SECTION

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO



PROPOSED CROSS-SECTION

NOTES:

ALL BACKFILL COMPACTED
TO 95% MODIFIED PROCTOR DENSITY
CONTRACTOR SHALL ENSURE MINIMUM
COVER IS MET PRIOR TO CROSSING

ASPHALT ROAD

- HL3 AND HL4 TO MATCH EXISTING THICKNESS
- 300mm OF 100% CRUSHED GRAN "A"
  EXTENDING TO SHOULDER

GRAVEL ROAD

- 200mm OF OPS GRANULAR "M"
  (CRUSHED DOLOMITE SOURCE)
  TO MATCH EXISTING ROAD WIDTH

ACCESS CULVERT

- 150mm OF 100% CRUSHED GRANULAR "A"

Dobbin Engineering Inc.
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Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME:
Lockhart Drain Culvert Detail

PROJECT No.
2022-1463

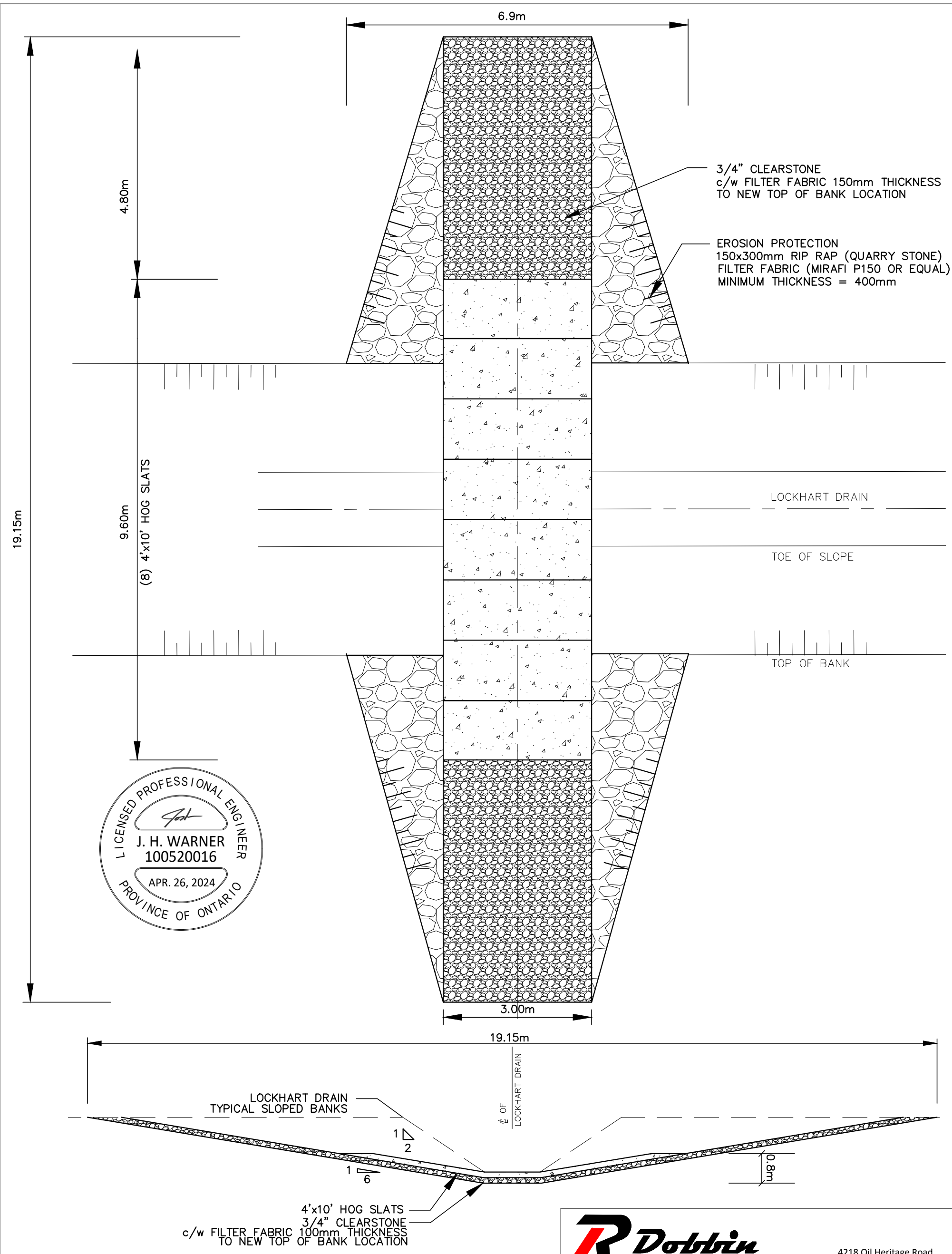
APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APR. 26, 2024	JW
B. VAN RUITENBURG				
DRAWN				
J. WARNER				

SCALE 1:75
0 2m

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN
TYPICAL CULVERT DETAIL

Last Updated: February 14, 2024



LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO

Dobbin Engineering Inc.

4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Culvert #9 Detail

PROJECT No. 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APR. 26, 2024	CS
B. VAN RUITENBURG	SCALE 1:75			
DRAWN	0 2m			
C. SAUNDERS				

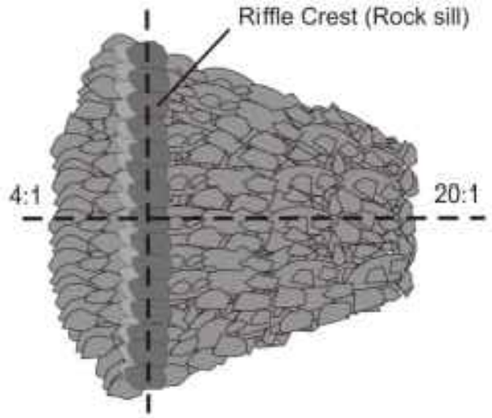
MUNICIPALITY of NORTH MIDDLESEX

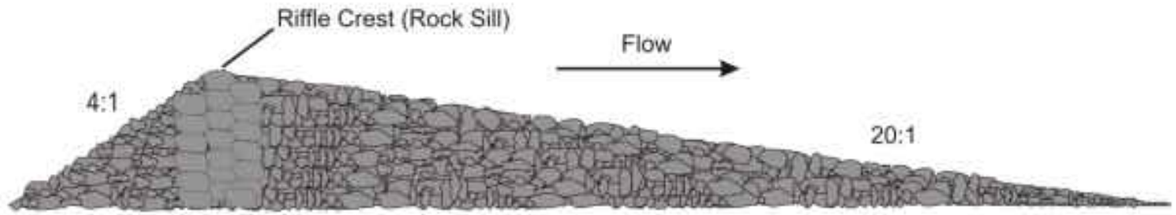
LOCKHART DRAIN
CULVERT #9 DETAIL

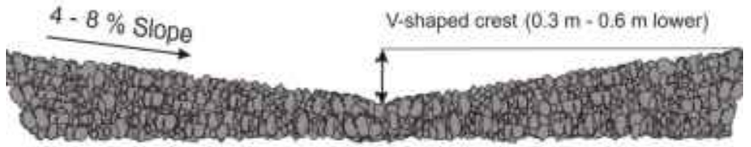
Last Updated: April 26, 2024

GENERAL NOTES

1. TOP OF THE WEIR CREST (ROCK SILL) SHALL BE 0.30m ABOVE THE PROPOSED CHANNEL BOTTOM.
2. THE AREA TO RECEIVE THE RIP RAP SHALL BE GRADED TO A DEPTH OF 300mm BELOW FINISHED GRADE. FILTER FABRIC SHALL THEN BE PLACED WITH ANY JOINTS OVERLAPPED A MINIMUM OF 600mm.
3. RIP RAP SHALL EXTEND FROM THE DITCH BOTTOM TO 1m ABOVE THE DITCH BOTTOM ON BOTH SIDES.
4. THE LARGEST RIP RAP SHALL BE USED AT THE RIFFLES CREST AND ON THE DOWNSTREAM SLOPE OF THE RIFFLE. ON THE DOWNSTREAM SLOPE THE RIP RAP SHALL BE SPACED 200 TO 300mm APART.
5. SMALLER RIP RAP SHALL BE PLACED ON THE SURFACE OF THE RIFFLE AND ALIGNED AND SPACED SO THAT THEY BREAK THE FLOW INTO PATHS THAT CAN BE FOLLOWED UP THE RIFFLE FACE BY MIGRATING FISH.
6. RIP RAP SHALL BE 150mm TO 300mm QUARRY STONE. AND SHALL EXTEND 0.50m ABOVE THE BOTTOM OF THE CHANNEL.







LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
APR. 26, 2024
PROVINCE OF ONTARIO

Dobbin Engineering Inc.
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Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Lockhart Drain Newbury Weir Detail
PROJECT No. 2022–1463

APPROVED J. WARNER
CHECKED B. VAN RUITENBURG
DRAWN J. WARNER

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APR. 26, 2024	JW

SCALE 1:50
0 1 2m

MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN "A"
NEWBURY WEIR DETAIL

Last Updated: April 26, 2024